ALLEGHENY PORTAGE RAILROAD

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Pennsylvania Railroad 766601

Allegheny Portage Railroad

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ALLEGHENY PORTAGE RAILROAD

ITS PLACE IN THE
MAIN LINE OF PUBLIC WORKS OF PENNSYLVANIA

FORERUNNER *of the* PENNSYLVANIA RAILROAD

PAMPHLETS

Crossing the Alleghenies in 1843

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VOL. 2 No. 1

PENNSYLVANIA RAILROAD
INFORMATION

FEBRUARY 1930

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ALLEGHENY PORTAGE RAILROAD

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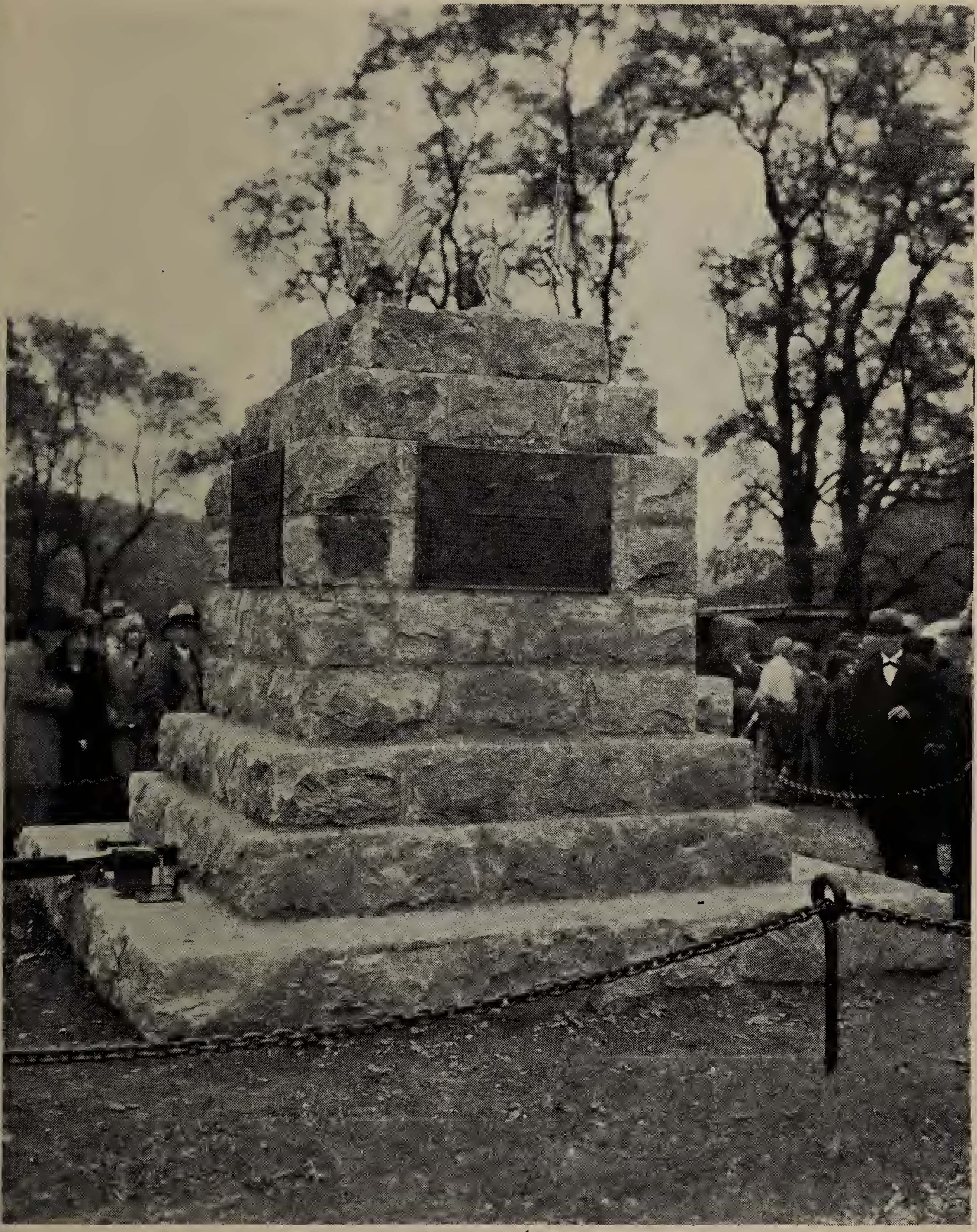
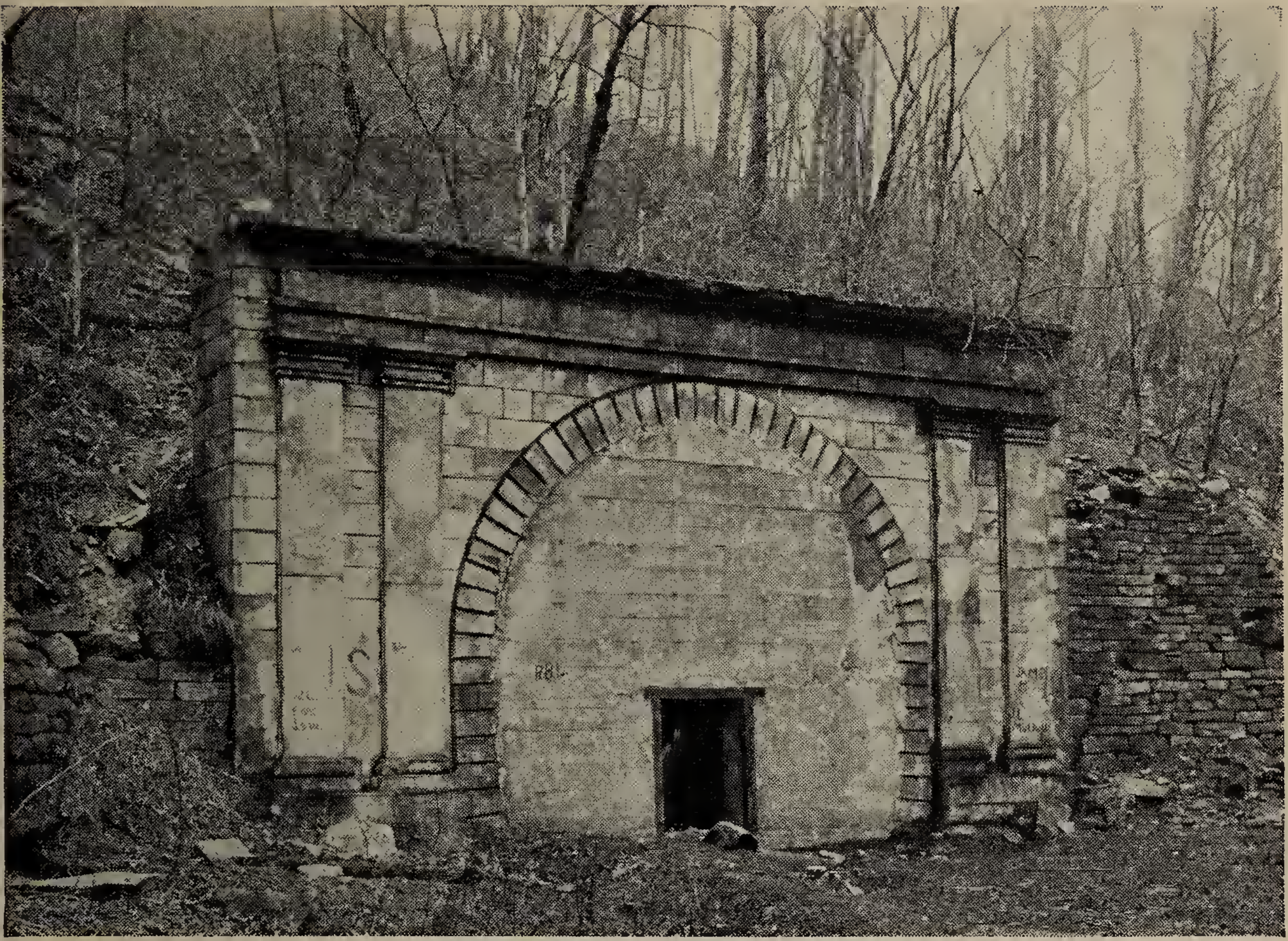


This monument to the Portage Railroad, on William Penn Highway, near Cresson, Pa., was unveiled on October 1, 1929

Group of Pennsylvania Railroad officers, with Governor John S. Fisher, at the dedication of the Portage Railroad monument. From left to right—F. J. Fell, Jr., Vice-President and Comptroller; A. J. County, Vice-President in Charge of Finance and Corporate Relations; William Elmer, Special Engineer; Governor Fisher; W. B. McCaleb, General Superintendent of Water Service; W. F. Miller, Engineer, Maintenance of Way, Eastern Pennsylvania General Division, and J. T. Wallis, Assistant Vice-President in Charge of Operation

ALLEGHENY PORTAGE RAILROAD



Staple Bend Tunnel, West Portal

ABANDONED, isolated and reclaimed by the wilderness, the first railroad tunnel in America keeps its lonely vigil at the Staple Bend of the Conemaugh river, about four miles east of Johnstown, Pa. It is the only Allegheny Portage Railroad structure of any consequence that has defied time and the elements for nearly a century. Although it has not been used for seventy-two years, this pioneer American tunnel is well preserved and is an impressive monument to the skill, energy and boldness exhibited by the citizens of the state almost 100 years ago in the construction and operation of the Main Line of Public Works of Pennsylvania.

This odd transportation route was a combination of canals and railroads, and the most remarkable link of all was the Allegheny Portage Railroad—a line of alternate inclined planes and graded levels over the mountains between Johnstown and Hollidaysburg, a distance of thirty-six miles. Opened for traffic in 1834, it soon won recognition as one of the world's outstanding feats of engineering. Operation of the road was finally discontinued on November 1, 1857, and dismantling of the line began in the following year.

Although no better monument to the Portage Railroad could be imagined than the old Staple Bend tunnel, its inaccessibility reduces its value as a public memorial virtually to zero. This explains why it was appropriate for the Commonwealth recently to commemorate the Portage Railroad by building and dedicating a formal marker adjacent to the William Penn Highway at a point about four miles east of Cresson, Pa.

The monument, twelve feet square at the base, is made of stone sleepers taken from the old roadbed. It stands only a few feet from the highway and on a plot of ground which formerly was part of the Portage right-of-way at the foot of plane No. 6. The site was recently deeded by the State to the Blair County Historical Society, and the monument was erected under the supervision of a commission appointed by Governor John S. Fisher. A legislative act of 1927, which authorized the appointment of the commission, also appropriated $10,000 for the erection of the monument and the construction of a scale working model of an inclined plane. The Blair County Historical Society will have custody of the model when it is completed.

Members of Commission

William Elmer, of Philadelphia, Special Engineer, Pennsylvania Railroad, who conceived the idea of building the monument, was chairman of the commission. The other members were Plymouth W. Snyder, former state senator from Blair county and a past-president of the Blair County Historical Society; Tarring S. Davis, superintendent of schools, Blair county; W. I. Woodcock, past-president of the Blair County Bar Association and former president of the Blair County Historical Society, and Thomas G. Peoples, register and recorder of deeds, Blair county.

Mr. Elmer presided at the unveiling ceremonies on Tuesday afternoon, October 1, 1929. Addresses were made by Mr. Snyder, Charles M. Schwab, A. J. County, Vice-President in Charge of Finance and Corporate Relations, Pennsylvania Railroad, and Governor Fisher. The monument was unveiled by Jonathan Leet, whose paternal great-grandfather was at one time canal supervisor. The Pennsylvania Railroad Middle

Division band and the Altoona Works choir provided music.

Governor Fisher, in the course of his address, referred to the Allegheny Portage Railroad as "the Mother of the Pennsylvania Railroad." This designation is, in a general way, justified, although a precise statement of the situation would be that the entire Main Line of Public Works, which embraced the Portage Railroad, was "the Mother of the Pennsylvania Railroad."

The intimate relationship between the Main Line of Public Works and the Pennsylvania Railroad is indicated by the following considerations:

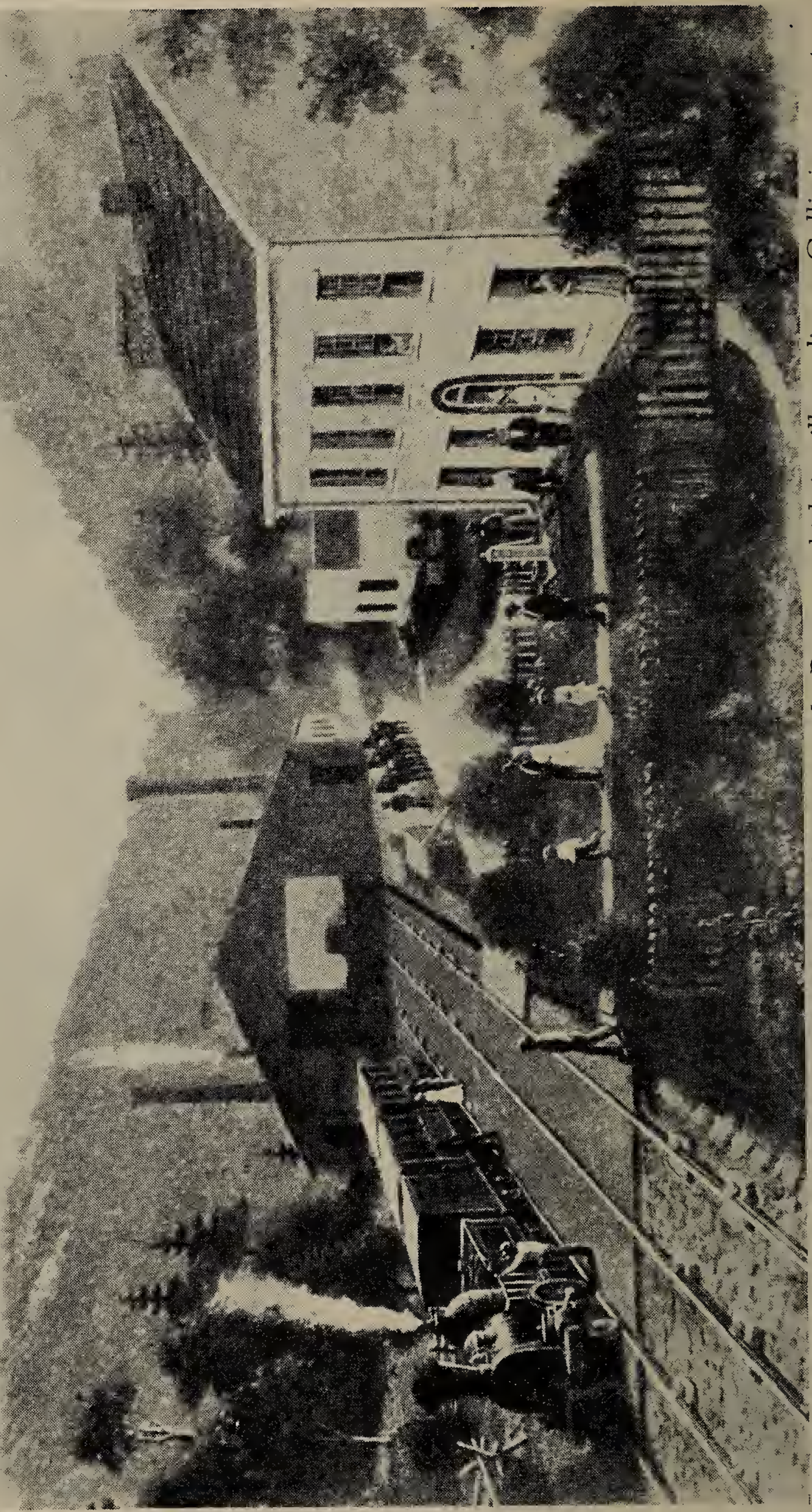
1. *The charter for the original Pennsylvania Railroad Company antedates the beginning of construction work on the Public Works.*

Col. John Stevens, of Hoboken, N. J., who had won a considerable following among influential citizens of Philadelphia with his proposal to build a railroad between Philadelphia and Pittsburgh, obtained from the Legislature in 1823 a charter for the Pennsylvania Railroad Company, authorizing the construction of a rail line from Philadelphia to Columbia. Stevens and his associates organized the company, but they were unable to raise the money needed to build the proposed railroad. The project, however, was kept alive by the support of the Society for Internal Improvement, organized in Philadelphia in 1824.

As a result of the activities of this society, the 1823 charter was amended by the Legislature in 1826 and again in 1828, but in each case the important provisions of the old charter, as conceived by Stevens, were retained. The Act of 1828 contained, however, a new and important provision. This was that the proposed railroad from Philadelphia to Columbia should be built at the expense of the state. The road was completed in 1834, and although it was commonly known as the Philadelphia and Columbia Railroad, the Act of 1828 stipulated that the enterprise should "be styled the Pennsylvania Railroad." Although this line was never extended by the state beyond Columbia, it did become an important link of the Main Line of Public Works.

2. *In the early days of the Pennsylvania Railroad's operation, the Company used both the Portage and Philadelphia and Columbia Railroads, under an arrangement with the Board of Canal Commissioners.*

Beginning on December 10, 1852, the Pennsylvania Railroad Company provided the first all-rail transportation service between Philadelphia and Pittsburgh. At that time, the Company's original line from Harris-



This old view of the Lemon House, a famous inn and station on the Portage, which is still standing at Gallitzin, was reproduced as a bas relief in bronze for the west face of the monument. A bas relief of the scene on the cover page is on the east face of the monument burg to Pittsburgh had just been completed, excepting that part between Altoona and Johnstown, which was known then as the Mountain Division. Until this difficult piece of railroad construction work was completed on February 15, 1854, the Portage Railroad was used by the Pennsylvania Railroad Company.

One of the two links east of Harrisburg in the Pennsylvania Railroad's all-rail route was the Philadelphia and Columbia Railroad between Dillerville and Philadelphia.

3. *The Pennsylvania Railroad Company finally bought the Main Line of Public Works from the state in 1857, and the routes of both the Philadelphia and Columbia and Portage Railroads are today represented in the lines of the Pennsylvania Railroad Company.*

Two years before the Pennsylvania Railroad acquired the Public Works, the state completed the construction of the New Portage Railroad, which avoided the use of inclined planes. Several levels of the old Portage were incorporated into the new line.

The Pennsylvania Railroad, however, soon discontinued the operation of the New Portage, and most of the iron rails were taken up in 1858 and sent west to be used in extending the Pittsburgh, Ft. Wayne and Chicago Railroad from Plymouth, Ind., to Chicago. A large number of the stone blocks which had supported the rails of the Portage Railroad were sent to Altoona and used in the construction of the Company's shops.

Several years later, the growth of traffic made it desirable for the Pennsylvania Railroad to provide an alternate double-track line over the mountains, and that part of the New Portage route between Duncansville and Cresson was used in building the present line from Petersburg to Cresson.

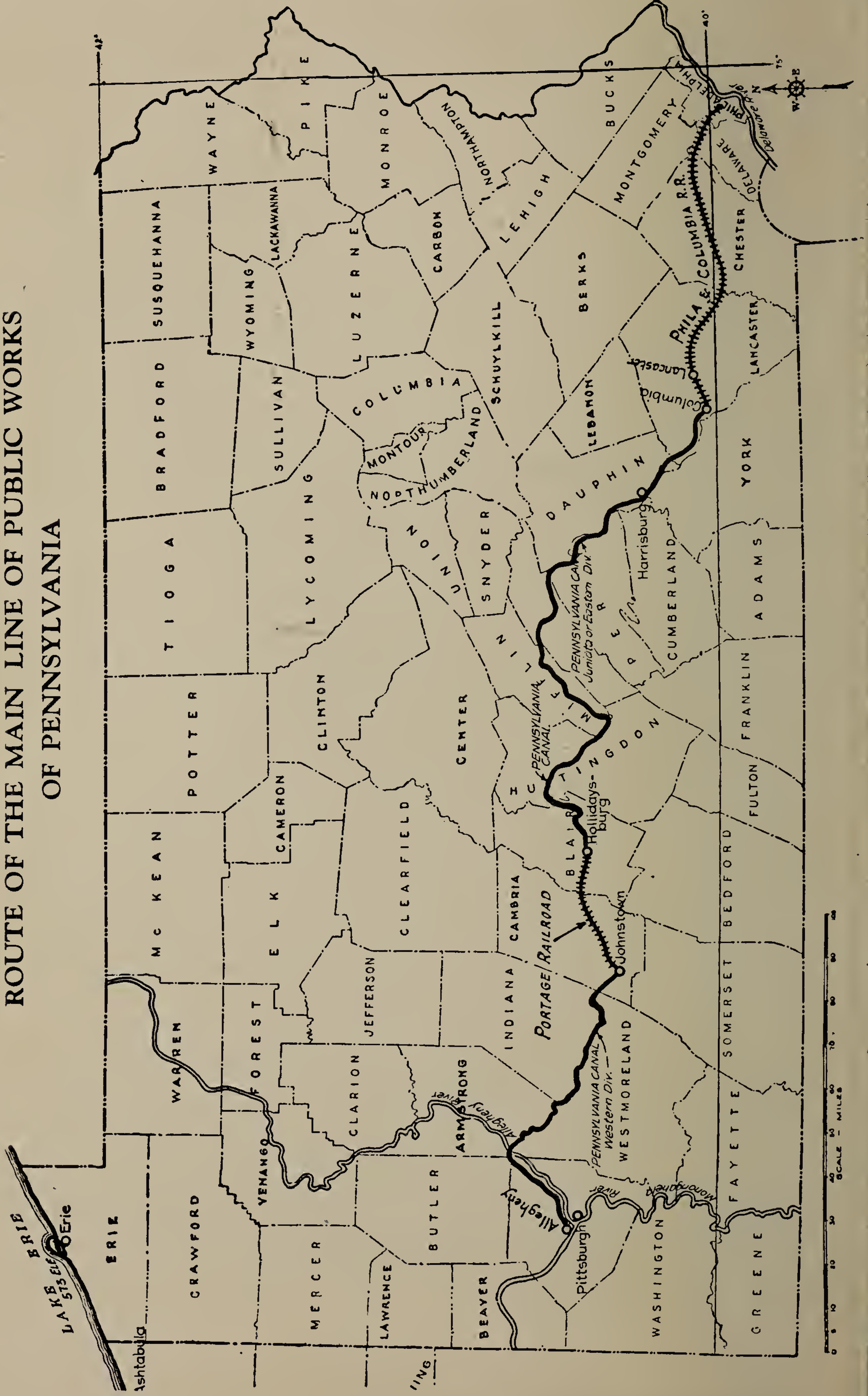
The Pennsylvania's main line between Philadelphia and Harrisburg at present follows about twenty miles of the right-of-way of the Philadelphia and Columbia Railroad.

Competition for Trade

Although chief interest is focused here on the Portage Railroad, an outline of the rise and decline of the Main Line of Public Works, of which that interesting mountain railway was a part, is needed to supply a proper background.

As the first quarter of the nineteenth century drew toward a close, trade rivalry assumed a new intensity among the three important Atlantic seaports—Philadelphia, New York and Baltimore. The rich prize on which all of them cast covetous eyes was the rapidly growing

ROUTE OF THE MAIN LINE OF PUBLIC WORKS OF PENNSYLVANIA



traffic to and from the Mississippi valley. The trade, handled slowly and laboriously by flat boat, pack train and Conestoga wagon, was sufficiently important to cause business leaders to envision, with eager anticipation, its potential volume, if only a faster and cheaper system of transportation were provided. A dominant position in the trade with the new West thus became the goal of each of the port cities.

Although Philadelphia was at that time the most important port and largest city in the country, she permitted New York to get away to a head-start in this contest. While the citizens of Philadelphia and Pennsylvania were debating whether to build canals or railroads, New York went ahead and built the Erie canal. Baltimore, lacking an easy canal route, was nervously marking time; later she put her faith in a railroad.

Completion of the Erie canal in 1825, connecting the navigable Hudson river at Albany with Lake Erie at Buffalo, gave New York its route to the interior, and it immediately began to divert a large part of the western trade to that port. This commercial coup d'etat spurred Philadelphia, and later Baltimore, to action.

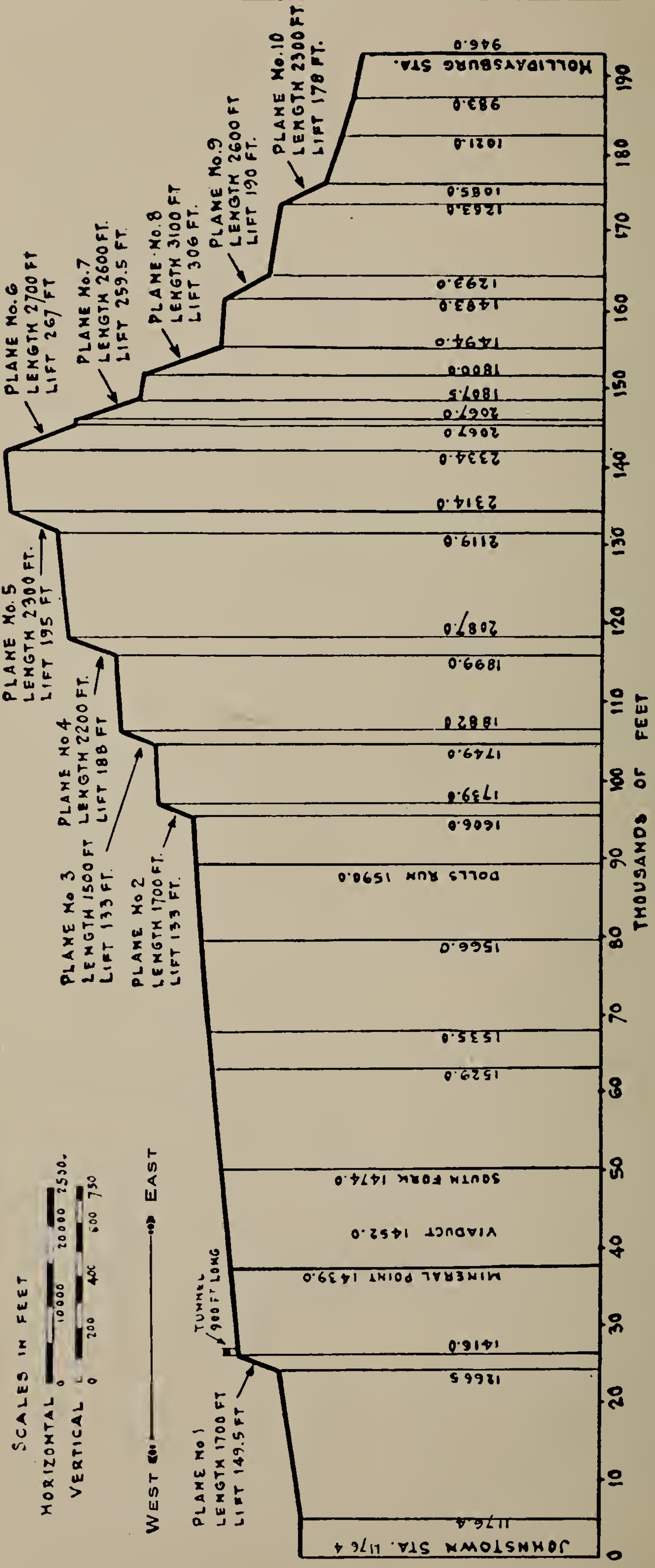
As a matter of fact, Philadelphia made a start toward working out its reprisal against New York the year before the Erie canal was opened. The Legislature, in 1824, created a Board of Canal Commissioners and instructed it to locate a route for a canal from Philadelphia to Pittsburgh. After investigation, the board decided, however, that a continuous canal was not feasible; therefore, it recommended a canal from Columbia to Hollidaysburg and from Johnstown to Pittsburgh and a railroad from Philadelphia to Columbia and from Hollidaysburg to Johnstown.

Rail-Water Route

On the basis of this report, the Commonwealth of Pennsylvania undertook and completed the construction of a combined canal and rail transportation system between the Port of Philadelphia and Pittsburgh, an important gateway to the West by virtue of its location at the head of navigation on the Ohio river. A little more than thirty years later, this strange transportation line was superseded by the Pennsylvania Railroad's all-rail route.

The legislative act authorizing the construction and operation of the Pennsylvania canal was signed by the Governor on February 25, 1826. After contracts for the canals had been let, construction work was started at Harrisburg on July 4, 1826.

In the following year, Balti-



PROFILE OF GRADES
ALLEGHENY PORTAGE RAILROAD

more, also seeking a route to Pittsburgh, came into action with the incorporation of the Baltimore & Ohio Railroad in April, 1827. Thirteen miles of line, between Baltimore and Ellicotts Mills, was in operation by May, 1830. During the next sixteen years the railroad was extended to Cumberland, Md. Early in 1853, the Baltimore & Ohio reached the Ohio river at Wheeling, W. Va. Finally, it entered Pittsburgh in 1874.

Construction of the Philadelphia and Columbia Railroad was authorized by an act of the Pennsylvania Legislature on March 4, 1828, and the canal commissioners let contracts for twenty miles at each end in April, 1829. The first track was completed in April, and the first train passed over the line on April 16, 1834. The second track was completed on October 1, of the same year.

The Legislature, by an act which received the governor's approval on March 21, 1831, authorized the canal commissioners to build the Allegheny Portage Railroad. The line was surveyed and located by engineers working under the direction of the canal commissioners, who, on May 25, 1831, let the contract for construction of that part of the road between Johnstown and the summit of the mountain. Contracts for the work between the summit and Hollidaysburg were awarded on July 29, of the same year. The first track was completed on March 18, 1834.

Completion of Public Works

The entire Main Line of Public Works came into full use when the second track of the Portage Railroad was completed on May 10, 1835.

The Main Line of Public Works consisted of the following stages: A double-track railroad from Philadelphia to Columbia, a distance of eighty-one miles; the Eastern and Juniata divisions of the Pennsylvania Canal from Columbia to Hollidaysburg, 173 miles; the double-track Allegheny Portage Railroad from Hollidaysburg to Johnstown, thirty-six miles, and, finally, the Western division of the Pennsylvania canal from Johnstown to Pittsburgh, 105 miles. This route was 395 miles long, with 117 miles covered by railroad and 278 miles by canal.

Compared with modern standards, transportation over this water-rail route was slow, cumbersome and expensive, but it was, nevertheless, a tremendous improvement over the stage coach and Conestoga wagon. Passengers were carried from Philadelphia to Pittsburgh by train and canal boat in three and a half days, and freight in five or six days. It previously had required about twenty days for freight to be transported between the same points by Conestoga wagon. Transportation costs also were greatly reduced. A typical example is cited: Prior to the opening of the Portage Railroad, the cost of transporting merchandise from Hollidaysburg to Blairsville, a distance of fifty-three miles, was from $12 to $16 a ton; the same service, performed by the Portage and canal, cost less than $4 a ton.

Portage a "Great Wonder"

An English traveler, who made the trip between Pittsburgh and Philadelphia in the summer of 1835, referred in his published letters to the Portage Railroad as that "great wonder of the internal improvements of Pennsylvania." It was all of that, without a doubt.

There were five levels and five inclined planes on both slopes, with a level, about 1½ miles long, on the crest of the mountain. Horses and locomotives supplied the power on the levels, while cars were drawn up and lowered down the planes on cables operated by stationary engines.

The highest point on the summit level was 2,397 feet above sea level, 1,172 feet above the canal basin at Johnstown and 1,399 feet above Hollidaysburg.

The total length of the ten inclined planes was 4.38 miles, overcoming 2,007 feet of elevation, while the eleven levels, aggregating 31.16 miles, overcame 564 feet of elevation.

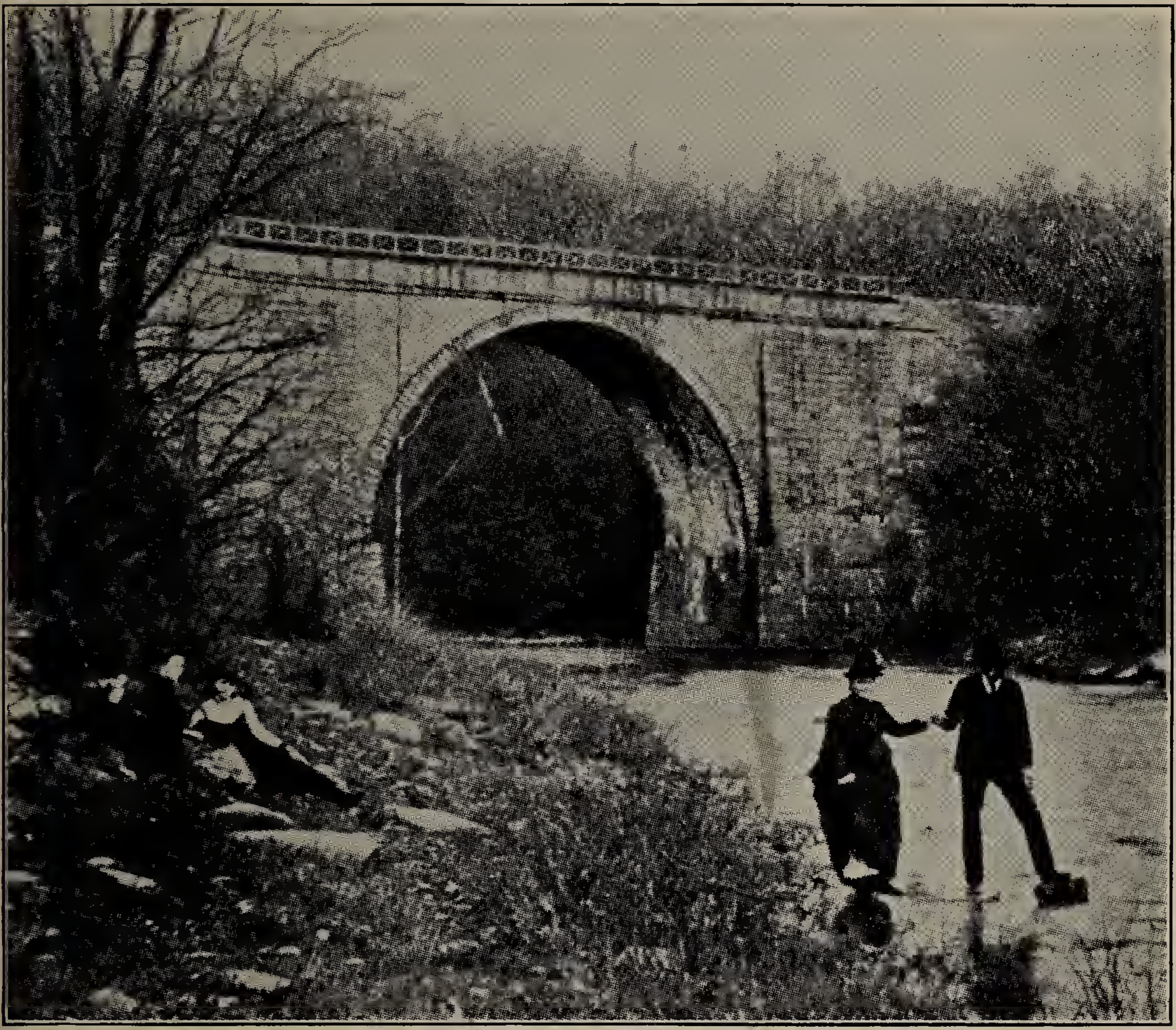
The planes on the east slope were much longer and steeper than those on the west side. Their total length was 13,502 feet, accounting for a rise of 1,205 feet, as compared with the planes on the west side, which aggregated 9,672 feet and overcame 802 feet of elevation. The steepest of the planes rose 10¼ feet in every 100 feet.

The planes were numbered from 1 to 10 eastward from Johnstown. No. 3, the shortest plane, was 1,480 feet long, with a perpendicular height of 130 feet and 6 inches. The longest plane, No. 8, was 3,117 feet in length and its head was 308 feet higher than its foot.

Tunnel and Bridge

The shortest level was between plane No. 6 and plane No. 7, and it was actually level. The longest level was from the head of plane No. 1 to the foot of plane No. 2. It was slightly more than 13 miles long and overcame 180 feet of elevation.

The "long level," as it was termed, was also distinguished by the fact that it contained both the Conemaugh viaduct and the Staple Bend tunnel, both of which were, for that time, spectacular features from an engineering viewpoint.



Conemaugh Viaduct

The bridge spanned the Conemaugh river at Horseshoe Bend, about eight miles east of Johnstown. William Bender Wilson, in his "History of The Pennsylvania Railroad," described it as the most conspicuous part of the Portage Railroad. The following extract is from Mr. Wilson's work:

"It (Conemaugh viaduct) was considered the most perfectly constructed arch in the United States. By erecting it, two miles in distance were saved. The foundations rested, one end on timber, the other on solid rock. It was a semi-circular arch of 80 feet span. The height of its abutment walls from the foundation to the springing line of the arch was 29 feet, and the height from low water to the springing line, 20 feet; rise of arch, 40 feet; thence to the top of the parapets, 9½ feet; making the whole height of the walls above the foundation 78½ feet, or 69½ feet above the surface of low water of the river. The width of the viaduct at the top of the parapets was 28 feet, and the width at the foundation, or the length of the face of the abutments, was 40 feet. The arch was 3½ feet thick at the springing line and 3 feet at the crown. The masonry was of the most substantial kind. The stones forming the face of the walls were light-colored sandstone, discovered in the neighborhood lying in the woods on the surface of the ground; many of them, after being prepared, contained from 12 to 25 cubic feet each. The beds and joints were well cut and fitted together. They were laid in mortar mixed without sand, and made from the siliceous limestone procured near the spot."

Destroyed by Flood

The contract for the bridge was let on August 4, 1831, and it was completed in the spring of 1833. It cost $54,562. This bridge was destroyed on May 31, 1889, during the Johnstown flood, after having been used continuously for more than fifty-five years.

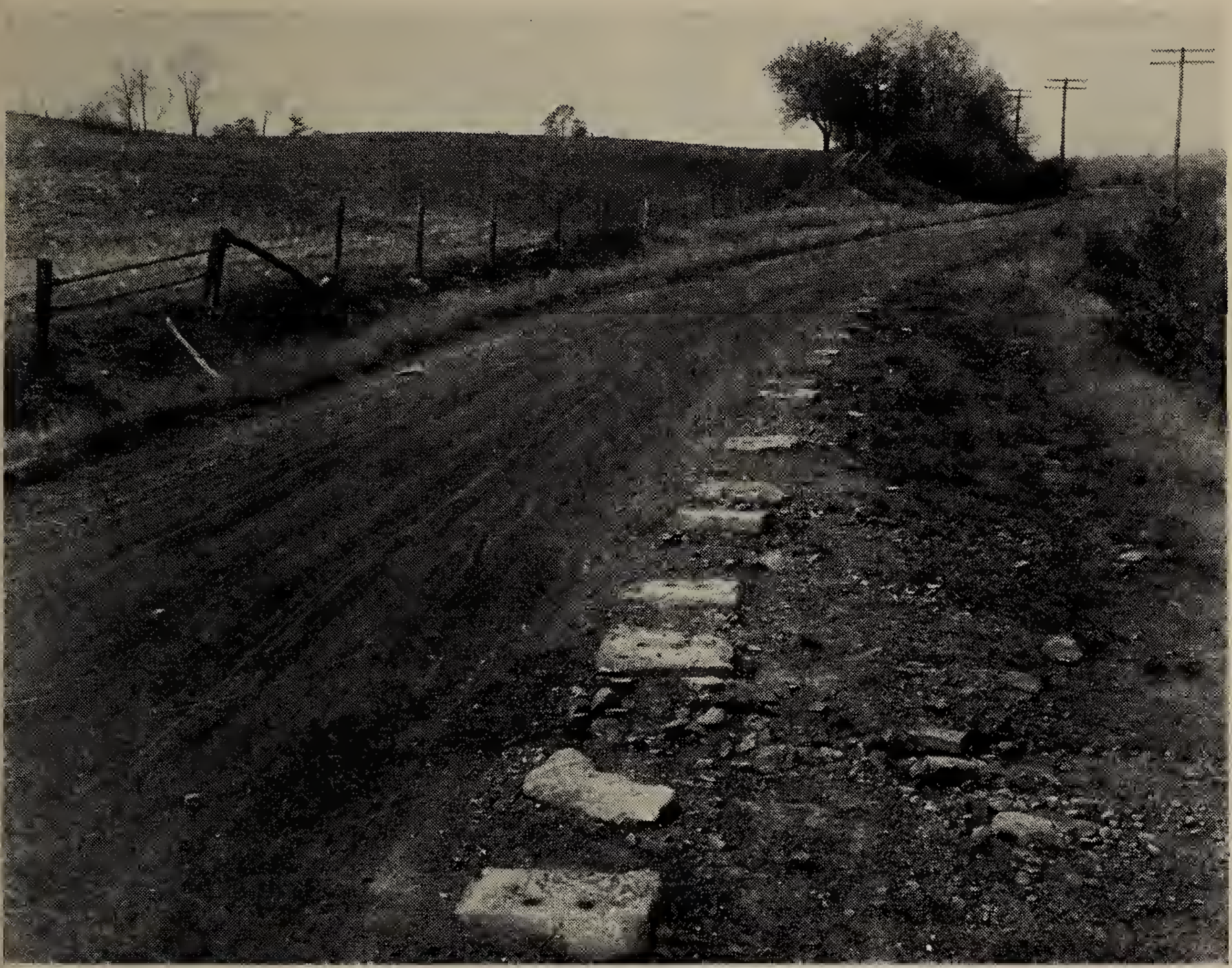
Staple Bend tunnel has already been referred to as the first railroad tunnel built in America. Its construction, at a cost of $37,500, shortened the line two miles. The tunnel is 901 feet long, 20 feet wide and 19 feet high within the arch. The arches were made of cut stone for a distance of 150 feet at each end. It has been abandoned since 1852.

Portage Opened in 1834

When the Portage Railroad was opened for traffic on March 18, 1834, only the first track had been completed. The second track was completed late in the spring of 1835. A roadbed twenty-five feet wide was graded along the right-of-way, which was 120 feet wide. The track gauge on the Portage was 4 feet 9 inches, and the distance between the two tracks, including the width of the inner rail of each, was 5 feet. Track construction was, however, not uniform throughout the line.

On the inclined planes of the first track, wooden rails of pine or oak, measuring 6 by 8 inches and capped with a flat bar of iron, were used. On solid ground the rails rested on stone blocks. Where the inclines traversed high embankments, however, the rails were supported by cross-ties four feet apart and resting at both ends on a continuous bed of crushed stone. The rails were notched into these ties and secured by wedges.

The flat bars of malleable iron which capped the wooden rails were 2¼ inches wide and ⅝ of an inch thick. Experience



Stone sleepers in their original positions, along the highway between Summit and Lilly, Pa., which follows the old Portage right-of-way

soon proved that white oak rails were far superior to pine rails. Under traffic, the iron bars soon worked loose from the softer pine rails.

On the levels of the first track, iron edge rails, 18 feet long and weighing 39½ pounds to the yard, were used. On parts of the line, they rested in iron rail chairs which were anchored to stone blocks; on others they were secured to cross-ties. Where stone blocks were used, the bottom of the bed of broken stone on which they rested was two feet below the surface, and covered drains were provided. Experience showed, however, that the foundation had not been carried deep enough to make the railroad impervious to the effects of freezing and thawing. In an effort to keep the rails from separating while frost was leaving the ground, cross-ties were laid between the stone blocks to bind the rails together. This difficulty of lateral separation of the rails was not experienced on that part of the first track where cross-ties were used.

Stone blocks were used exclusively in the second track to support the rails. On the sharper curves every third stone block extended across the track in the manner of a cross-tie. This, of course, prevented lateral separation. On account of the expense involved, this procedure was not followed on the easier curves and the straight stretches of the second track. The same difficulty of spreading rails was experienced here until, finally, cross-ties were placed between the stone blocks.

Machinery on the Planes

To allow for emergencies, two stationary engines, each having two cylinders but no fly-wheel, were set up on cast-iron frames at the head of each plane. The engines operating six of the planes (Nos. 1, 3, 4, 6, 7 and 8) had cylinders 14 inches in diameter, with a stroke 5 feet. Those on the other planes were smaller. Each large engine had three cylindrical boilers, each of which was 30 inches in diameter and 20 feet long. The boilers of the smaller engines were only 18 feet long. All the boilers were made of rolled iron, one-fourth of an inch thick.

The machinery that worked the cables was in a pit under the railroad, at the sides of which stood the stationary engines. The endless cable was actuated by two large pulley-wheels, each 8 feet in diameter at the bottom of the groove. Both were placed in a vertical position, one under the ascending track and the other under the descending track, and they revolved in opposite directions. In addition, there was a large horizontal wheel at the bottom of the pit in the end nearest the inclined plane, and another at the foot of the plane. Thus the ascending side of the cable passed over one of the vertical wheels, around the horizontal wheel in the end of the pit, then across to and around the other vertical wheel and on down the incline to the wheel at the foot of the plane. The wheel in the bottom of the pit and the one at the foot of the plane were mounted on movable carriages, by which compensation was made for contraction and expansion of the rope.

Operation by Gravity

Power from the engine was transmitted to the sheaves through a system of shafts, cranks and cog-wheels. When the descending cars were heavier by a sufficient margin than the ascending cars, or when there were no ascending cars, the engine power was cut off the vertical wheels, and the rope and wheels were set in motion by the gravity of the descending cars. In such cases, the velocity of the descending cars was regulated by a water cylinder in the pit.

The ropes with which the planes began operation were made of hemp and ranged from 3,616 feet to 6,662 feet in length. Seven of them, including an extra rope, were each 7 inches in circumference, and the four others were 6¼ inches in circumference. Four of the ropes were made in one piece, while the others were spliced.

During the summer of 1836, heavier ropes were obtained. The circumference of the new ropes was 8 inches, excepting the one for plane No. 9, which was one-half inch smaller.

The average price was $3,000 and, under the most favorable conditions, the ropes lasted about sixteen months. This length of service was obtained only after the practice of tarring the ropes was adopted in 1841.

Wire Cables Appear

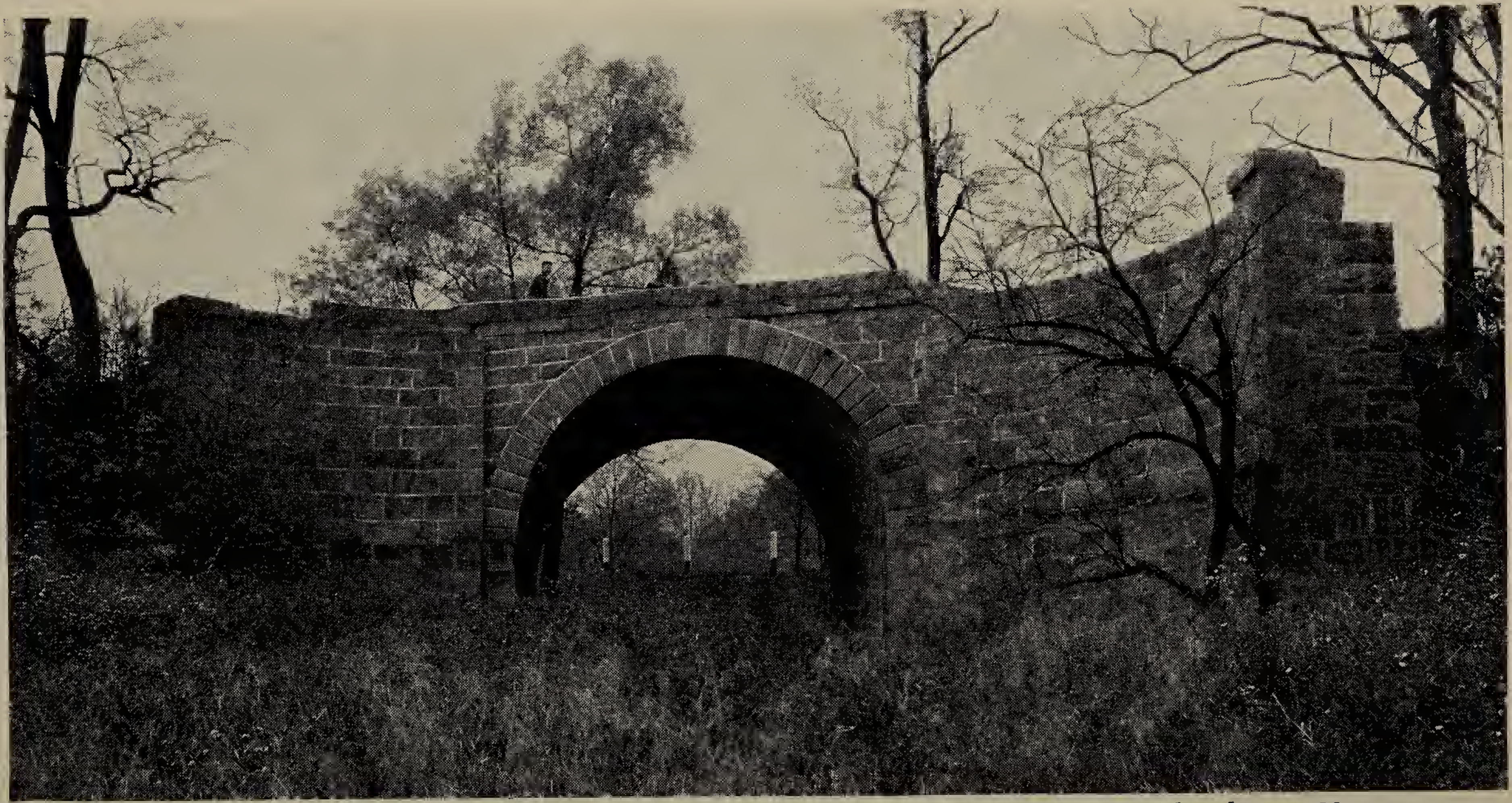
The first wire cable was tried out on plane No. 3 in the summer of 1842, but it was not satisfactory. After some alterations had been made on the sheaves, the new cable was used successfully on this plane during the season of 1843. A similar cable was used on plane No. 10 in 1844. Planes 1 and 6 received wire cables in 1845, as did plane No. 2 in 1846 and planes Nos. 3, 6, 8 and 9 in 1847. Hempen ropes were eliminated with the opening of the season in 1849.

Motive Power on the Levels

At first, horses were used exclusively to draw the cars along the levels of the Portage. The canal commissioners soon decided, however, that the use of steam power was possible and desirable on three levels, aggregating twenty-two miles. Three locomotives were, therefore, ordered late in 1834. The locomotive "Boston" was placed in service on the level between Planes 1 and 2 on May 10, 1835, and two others, "Delaware" and "Allegheny," soon began running, but they were unsatisfactory. The fourth locomotive built for the Portage Railroad was the "Pittsburgh," and it was delivered on September 3, 1835.

"The Boston," the first locomotive to be used on the Portage, weighed 8½ tons, without water or fuel. Its cylinders were 8 inches in diameter, and the stroke was 16 inches. It had a pair of small driving wheels, each 4 feet in diameter, with wooden rims and spokes. These wheels were fitted with iron tires, but had no flanges. Its steam pressure was 125 pounds to the square inch, and its average speed was about ten miles an hour.

It was demonstrated in September, 1836, that locomotives



This stone bridge, which stands a few yards from the newly erected monument to the Portage Railroad, is itself an interesting relic of the Old Portage. It is a "skew arch" bridge, and was built by the state, about 1832, to carry the old highway over what was formerly inclined plane No. 6. The arch is a splendid specimen of dry-stone masonry, with the horizontal axis of the arch making other than right angles with its abutments. This type of construction requires the laying of the stones of the arch in oblique positions and the cutting of the stones themselves into peculiar shapes. When the William Penn Highway was built in 1922, this sturdy old bridge was avoided by straightening out a sharp curve could be used on the Hollidaysburg level, where the steepest grade was fifty-two feet to the mile. The "Backwoodsman," a locomotive built in Pittsburgh for the Philadelphia and Columbia Railroad, was held over there for a test at the order of the canal commissioners. It was worked on this level for several days with ease and economy.

Horses Eliminated

In the following year, two locomotives were assigned to the Hollidaysburg level and two to the level next to Johnstown. Counting the eight already in use on the level between Planes 1 and 2, twelve locomotives were thus in regular service on the Portage in 1837. By the close of 1839, three locomotives had been put on the level between Planes 4 and 5, making a total of seventeen distributed among the four longer levels.

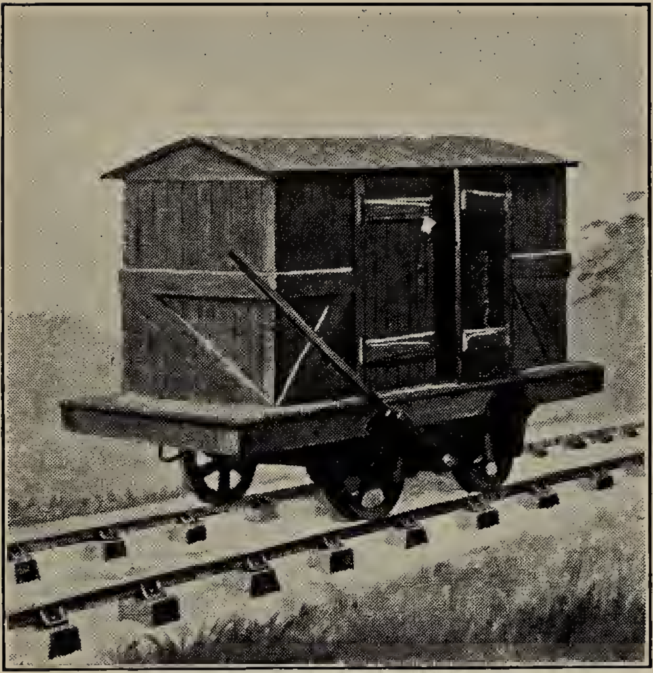
The process of substituting locomotives for horses was gradually continued, until finally in 1850 horses were being used only between Planes 8 and 9, and locomotives were put on this level at the opening of the season in 1851.

Transportation over the Portage Railroad was conducted only by individual transporters and forwarding companies from the opening of the road in 1834 to the spring of 1843, when the state put into service its first trucks for the handling of sectional boats, as well as its first cars for the accommodation of passengers. Although this action marked the beginning of transportation by the state on its own account, it did not mean that the private transporting companies were eliminated; on the contrary, they continued in business until the road passed out of existence.

For more than a year after the Portage was opened, the business of conducting transportation was entirely in the hands of transporters. The state merely provided the railway and motive power on the planes, while the transporters supplied their own cars and horses, and paid tolls to the state for the use of the roadway.

Movement of Traffic

With the control of motive power thus in the hands of the transporters and drivers, the movement of traffic was without rhyme or reason. Transporters started out trains whenever they saw fit to do so, and each driver was a law unto himself—stopping to rest the horses, or to feed them, wherever the whim struck him. This "do as you please" method caused endless delay and inconvenience, diminished the utility of the road and reduced the state's revenue.



Type of freight car used on the Portage Railroad

The obvious solution was for the state to supply the motive power and to control its use, and this policy was adopted in a bill enacted by the Legislature on April 15, 1834, authorizing the canal commissioners to supply locomotives for the levels where they could be used and to prescribe rules for the handling of traffic. The introduction of the locomotive and the gradual extension of its use on the Portage has already been outlined, so it is only necessary here to recall the fact that the first locomotive began running on the level between planes 2 and 3 in May, 1835. One of the rules adopted by the canal commissioners required trains to be started at regular intervals and moved over the road at uniform speed—fifteen miles an hour for mail and passenger trains and ten miles an hour for freight trains.

During the process of substituting locomotives for horses, trains drawn by horses were permitted to move over the road, but preference was accorded to trains drawn by locomotives. Appointment by the state of two superintendents of transportation, one at Johnstown and the other at Hollidaysburg, whose duty was to supervise the making-up and dispatching of trains, was another step by the state that helped to bring orderliness and regularity into the traffic movement. At the same time the state appointed another official, known as horse-master, who had charge of the movement of trains drawn by horses.

It has been pointed out previously that horses disappeared from the levels of the Portage with the close of the operating season in 1850.

Rates

The system of tolls in effect on the Portage was simple. It exacted from the transporters the payment of one cent a mile for each freight car passing over the road. If the freight cars were loaded, an additional charge, equal to double the amount per mile of tolls charged on the canal for the same articles, was made. The toll on each passenger car was two cents a mile, and one cent a mile additional for each passenger over 12 years of age and one-half cent a mile for each passenger between the ages of 6 and 12.

Rolling Stock

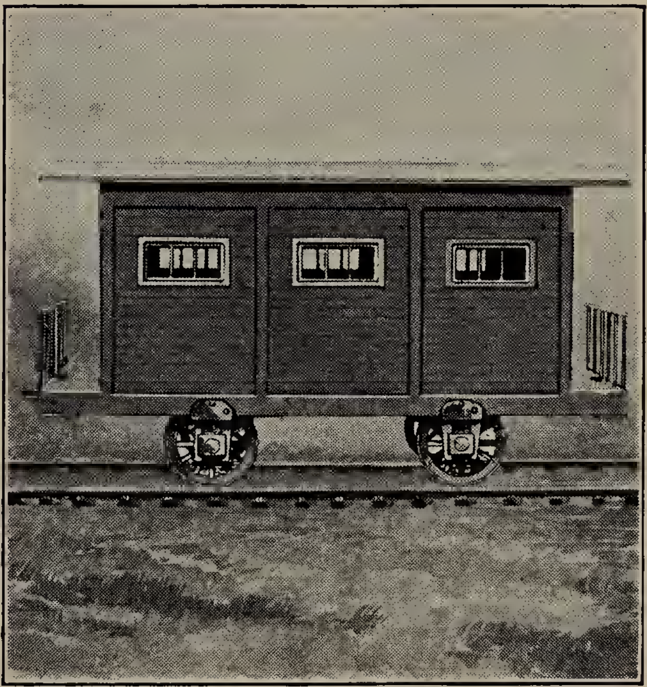
During the first year, when horses were used exclusively on the levels, the average price paid by transporters for the right to move a ton of freight over the road was \$2.31½. In 1835, after locomotives had been introduced on one level, the average toll was 96 cents a ton when cars passed over the road loaded in both directions, and \$1.20 a ton when loaded one way and empty the other.

Transporting companies had twenty-five cars ready for service at the time the Portage was opened. Although this number was increased to eighty within a month, the rolling stock was inadequate to handle the traffic, and for some time much freight continued to be carried over the mountains in road wagons. The freight cars supplied by the forwarding companies were capable of carrying as much as 7,000 pounds of coal or iron, although the maximum load of merchandise or produce never exceeded 6,250 pounds.

In the season of 1835, transporters had six passenger cars in regular service on the Portage, the average capacity of which was eleven persons.

A search of source material fails, unfortunately, to reveal just when the practice of hauling sectional boats, with their cargoes, over the Portage was started. It appears, however, that the practice was well established by 1840, and certain references suggest that a few sectional boats appeared soon after the Portage was opened.

One writer makes this statement in his account of the opening of the Portage: "Trade over the road was promptly begun under the auspices of several transportation companies, among them being Dougherty's Section Boat and Union Line." The obvious inference here is that at least a few


Four-wheel passenger car of type used on the Portage Railroad in 1835

sectional boats were available soon after the road was completed.

John Dougherty, of Hollidaysburg, who described himself as the inventor of the portable boat, issued a circular in 1839 announcing his decision "to throw open to the public (with certain restrictions) the right to build boats in sections." After explaining that he had devoted five years to the business of transportation on the Main Line of Public Works, Mr. Dougherty said that "in order to overcome the difficulties referred to (the transfer of freight between boats and cars), I have introduced on our railways and canals the use of boats built in sections."

Since Mr. Dougherty gives no date for this event, the introduction of the sectional boat must be assigned loosely to the five year period between the opening of the Portage in 1834 and 1839, when the circular was issued.

Container Car Principle

During the same period another method was used to some extent to facilitate the movement of through freight. It involved the construction of railroad cars with movable bodies that could be hoisted by derricks off the cars and placed on the decks of canal boats designed especially for the purpose.

One authority says: "The portable method was soon (after the opening of the Portage) generally adopted by the more enterprising shipping firms."

These practices on the Public Works undoubtedly constituted the first application on a large scale in this country of the container car principle, which has been developed in a modern manner within the last two years by the Pennsylvania and other railroads.

State Supplies Trucks

The state began hauling sectional boats on its own account over the Portage in 1843. The Legislature authorized the canal commissioners in 1842 to have eighteen sets of trucks, of four cars each, for the conveyance of sectional boats, constructed, and ten sets were ready for service the next spring. The state's new policy was dictated by a desire to increase the traffic. The authorities believed that if the state supplied the necessary trucks on the Portage virtually every person who could acquire a sectional boat would become a patron. This object was largely realized, in spite of strenuous opposition at first from the established transporting lines.

Canvass White, an engineer who had charge of the Portage route survey made in 1826, was first to suggest officially that it would be possible to build canal boats in sections for transportation over the Portage Railroad. In a report to the canal commissioners in that year, Mr. White wrote: "I would suggest the idea of making the canal boats in three or four pieces, to be divided transversely, and transported over the Portage without changing the cargo."

It fell to others, however, to invent and refine the portable boats actually used on the Public Works. John Elgar, of Baltimore, obtained a patent on November 7, 1835, for what he described as "certain improvements in the art of, and in apparatus for the conveyance or transportation of goods, on a line where canals and railroads form alternate links in the chain of communication, as for example, on the great Pennsylvania line from Philadelphia to Pittsburgh."

Dougherty's Plan

John Dougherty received a patent on February 24, 1843, covering certain improvements on the Elgar devices. In the patent specifications, Mr. Dougherty said:

"I connect these boats together, when they are used on canals, in such manner as that there shall be two sections in width and three, or more, in length. In this respect, my plan of connecting the sections is not the same as that adopted by Mr. John Elgar, who proposed to connect them in a continuous line, and in such manner that they should possess a certain degree of flexibility at the places where they were joined."

After enumerating several objections to this method, Mr. Dougherty continued:

"I obviate (these objections) by attaching to the fore end of each section, which is to have a rear section joined to it, a plate of iron, six or eight inches in width, and of such length as that it shall extend entirely across the under part of the section, from side to side, and sufficiently high on each side to confine the two parts, or sections, in place. Such plates are to be bent so as to conform to the curvature of the bottom; are to be fastened to one of the segments by bolts, or otherwise, and to project over and form a ledge, say two-thirds of their width, so that the rear section may be received and rest upon it. The sections are then to be firmly secured end to end, by loops and keys, or in some analogous mode, until the intended length is obtained; and two such series of sections are to be secured by bolts, bars or clamps, side by side, and are thus to constitute a combined boat, of the ordinary width of a canal boat, and in length adapted to the locks through which they are to pass."

Unfortunately, no drawing

exists showing the structural details of the sectional boats as actually built and operated on the Public Works.

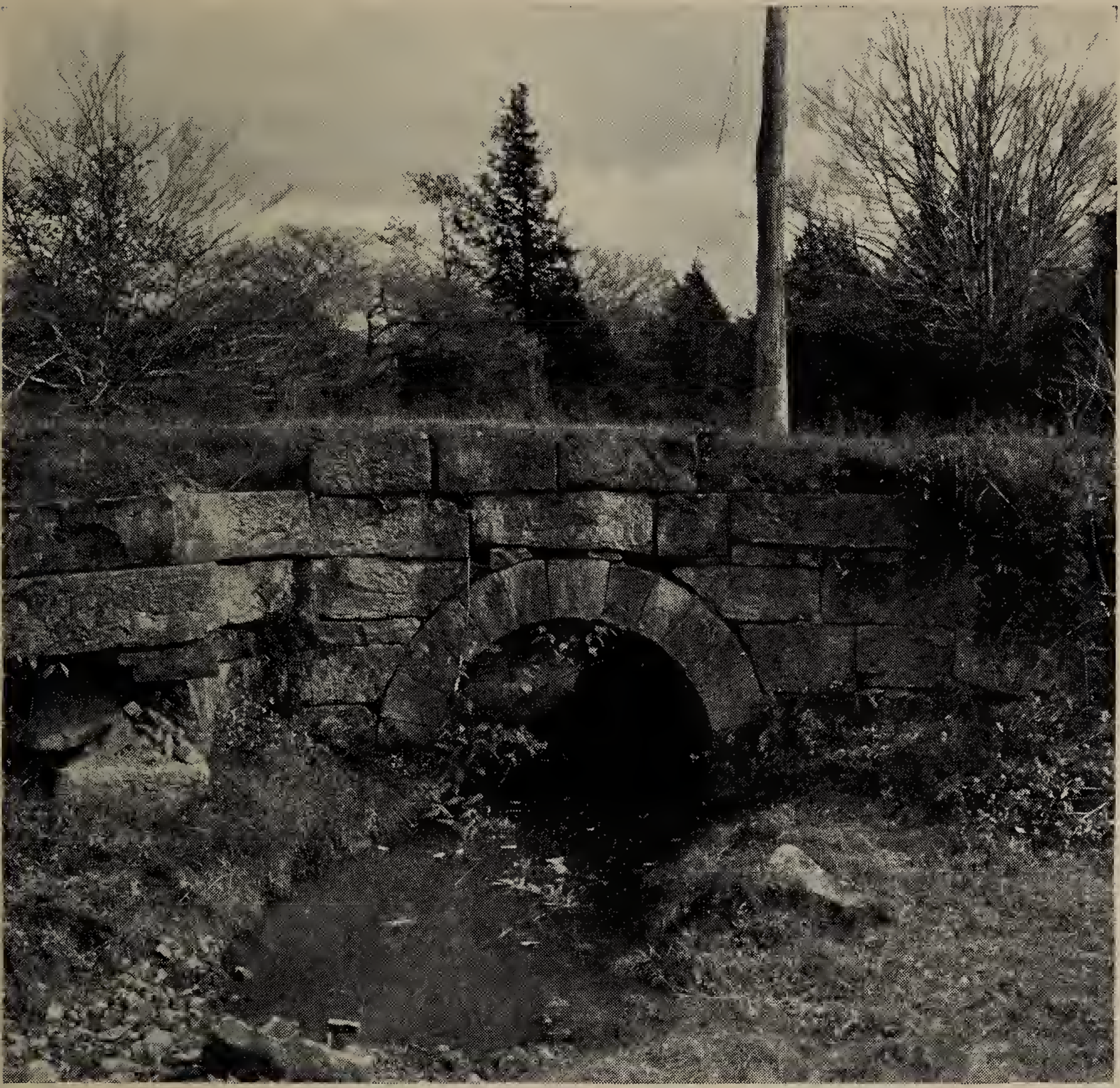
Fails to Fulfil Mission

It requires no imagination to realize that the operation of sectional boats, although an improvement over the earlier practice, was slow and tedious business. On the westward trip, for example, the sections, mounted on a truck, were moved by rail to Columbia, where they were lowered into the canal basin. After a boat had been assembled by coupling two or more sections together, it was towed up the canal. Mules or horses, hitched in tandem, plodded along the towpath. On arrival at Hollidaysburg, the sections were separated, taken from the water and each mounted again on a truck for passage over the Portage Railroad to Johnstown. At that point, the sections were returned to the water and reassembled for the remainder of the journey to Pittsburgh.

In spite of the tremendous service performed through a life of twenty-three years, the Public Works must, after all, be accounted a gigantic failure. The chief indictment against it was that it failed to attract a proper share of the competitive traffic moving between the West and the Atlantic seaboard; and the principal reason for this failure was its slowness and uncertainty. Because of the delay and inconvenience caused by transfers between canals and railroads and the use of inclined planes on the Portage, it was impossible to attain satisfactory speed and regularity of movement. For example, when the Portage was at the height of its usefulness, it was necessary to change power thirty-three times in moving a train of cars over the thirty-six miles of line. This operation involved the use of twelve stationary engines, twelve teams of horses and nine locomotives and the services of fifty-four men.

Ice and Floods

Further obstacles to the success of the Public Works were the fact that the canals were closed by ice three or four months of the year and that operations were frequently interrupted by floods. In addition, the project never approached, even remotely, a self-sustaining basis, due to the gross mismanagement and rampant graft that marked the construction and operation of the line by the state. A debt of approximately $40,000,000 was left behind when the State Works were finally sold—a typical souvenir of the losses, corruption and inefficiency inseparable from state ownership and operation of public utilities.



An original culvert under the right-of-way of the Portage Railroad. The highway between Summit and Lilly, Pa., now passes over this culvert

The inadequacy of the Portage Railroad with inclined planes became apparent soon after the road was opened, and even as early as 1836 the Legislature, by resolution, directed the canal commissioners to have a survey made to find a route by which the use of inclined planes could be avoided. No action was taken, however, until after work on the construction of the Pennsylvania Railroad's line from Harrisburg to Pittsburgh was started in 1847. Finally, after a series of surveys, the Legislature authorized the work necessary to eliminate the planes between Johnstown and the summit. The contracts were awarded in April, 1851, and the use of planes 1, 2 and 3 had been discontinued by January 1, 1853. Two years later, the new line, avoiding all planes and known as the New Portage Railroad, was opened for traffic. It cost the state $2,143,355 to eliminate the planes.

The building of the New Portage was merely another blunder on the part of the state. It was not started, as previously indicated, until after the Pennsylvania Railroad Company had begun the construction of its original line. The need of Philadelphia and Pennsylvania for something better than the decrepit Public Works had reached a critical stage when the Baltimore & Ohio Railroad arrived at Cumberland and began petitioning the Pennsylvania Legislature for authority to build on across part of the state to Pittsburgh. It was argued before the Legislature in 1846 that only an all-rail line between Philadelphia and Pittsburgh would restore Philadelphia to her former position of commercial prestige and protect her welfare in the future.

That was just what the Pennsylvania Railroad was intended to do, in conjunction with the Harrisburg, Portsmouth, Mt. Joy and Lancaster Railroad and the Philadelphia and Columbia Railroad, which linked Philadelphia and Harrisburg. Therefore, a charter was granted to the Pennsylvania Railroad Company, while the petition of the Baltimore & Ohio Railroad was denied.

The Pennsylvania Railroad, by using temporarily the Portage Railroad, was able to open its all-rail line between Philadelphia and Pittsburgh in 1852. The Mountain Division, between Johnstown and Altoona, was not completed until December 10, 1854, when the Company operated the first through service without change of cars between Philadelphia and Pittsburgh.

Sale of Public Works

This marked the withdrawal of Pennsylvania Railroad business from the Portage and its doom was sealed. The state, disregarding this patent fact, went ahead, nevertheless, and completed the construction of the New Portage, in the face of insistent public demand for the sale of the entire Main Line of Public Works.

The Legislature finally authorized the sale, and the Pennsylvania Railroad Company bought the Public Works at public auction on June 15, 1857. The price was $7,500,000.

The Company took possession of the Public Works on August 1. After operating the New Portage for three months, the Pennsylvania Railroad closed the road on November 1, 1857, and began dismantling it.

"GREAT WONDER OF THE INTERNAL IMPROVEMENTS OF PENNSYLVANIA"

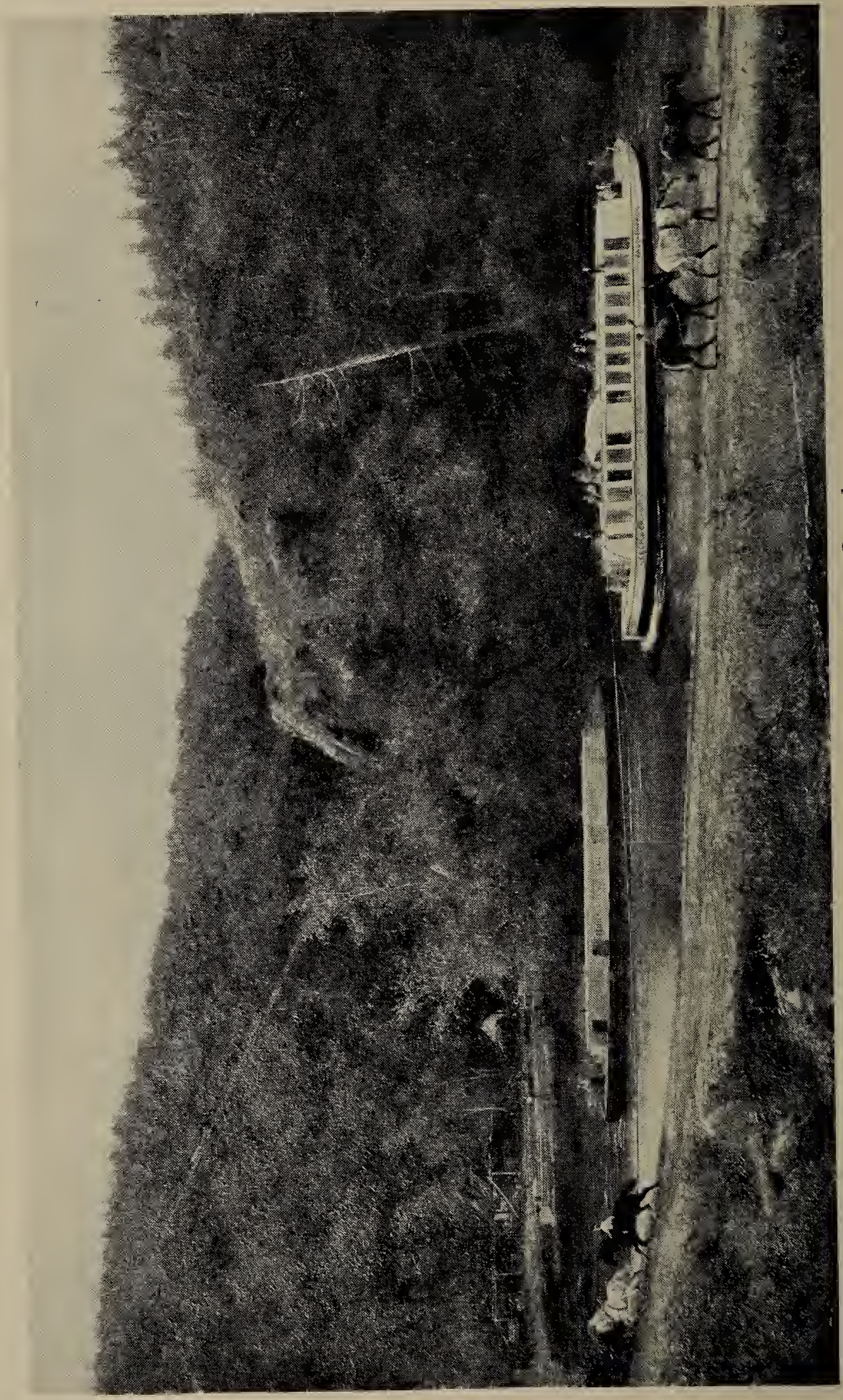
THE source of one of the most illuminating accounts of a trip over the Main Line of Public Works is a volume entitled "Peregrinations of Peregrin Prolix." Samuel Rea, former President of the Pennsylvania Railroad, who died March 24, 1929, at one time owned a copy of this rare volume, which he finally presented to the Pennsylvania Railroad's Mechanics Library at Altoona. Several years ago the Pennsylvania Railroad Company gave all the books in this library to the City of Altoona, and since then the "Peregrinations of Peregrin Prolix" has disappeared. Fortunately, however, Hon. Plymouth W. Snyder, of Hollidaysburg, Pa., took advantage of an opportunity several years ago, before the volume was given to the Mechanics Library at Altoona, to copy voluminous extracts from it. These extracts are still in Mr. Snyder's possession.

"Peregrin Prolix" was a pen name under which an English traveler, who made a trip over the Main Line of Public Works in the summer of 1835, wrote a series of letters.

On the westward trip, "Peregrin Prolix" traveled between Philadelphia and Hollidaysburg via the Philadelphia and Columbia Railroad and the Pennsylvania canal, but used a stage coach from Hollidaysburg to Pittsburgh. On the return trip to Philadelphia he made the entire journey on the Main Line of Public Works.

The letter in which he describes his trip on August 20, 1835, over the Allegheny Portage Railroad from Johnstown to Hollidaysburg, follows:

"Yesterday at Johnstown we soon despatched a good breakfast and at 6 a. m. were in motion on the first level, as it is called, of four miles length, leading to the foot of the first inclined plane. The level has an ascent of 101 feet and we passed over it in horse drawn cars with the speed of six miles an hour. This is a very interesting part of the route, not only on account of the wildness and beauty of the scenery, but also of the excitement mingled with vague apprehension which takes possession of everybody in approaching the great wonder of the internal improvements of Pennsylvania. In six hours the cars and passengers were to be raised 1,172 feet of perpendicular height and to be lowered 1,400 feet of perpendicular descent, by complicated, powerful and frangible machinery, and were to pass a mountain, to



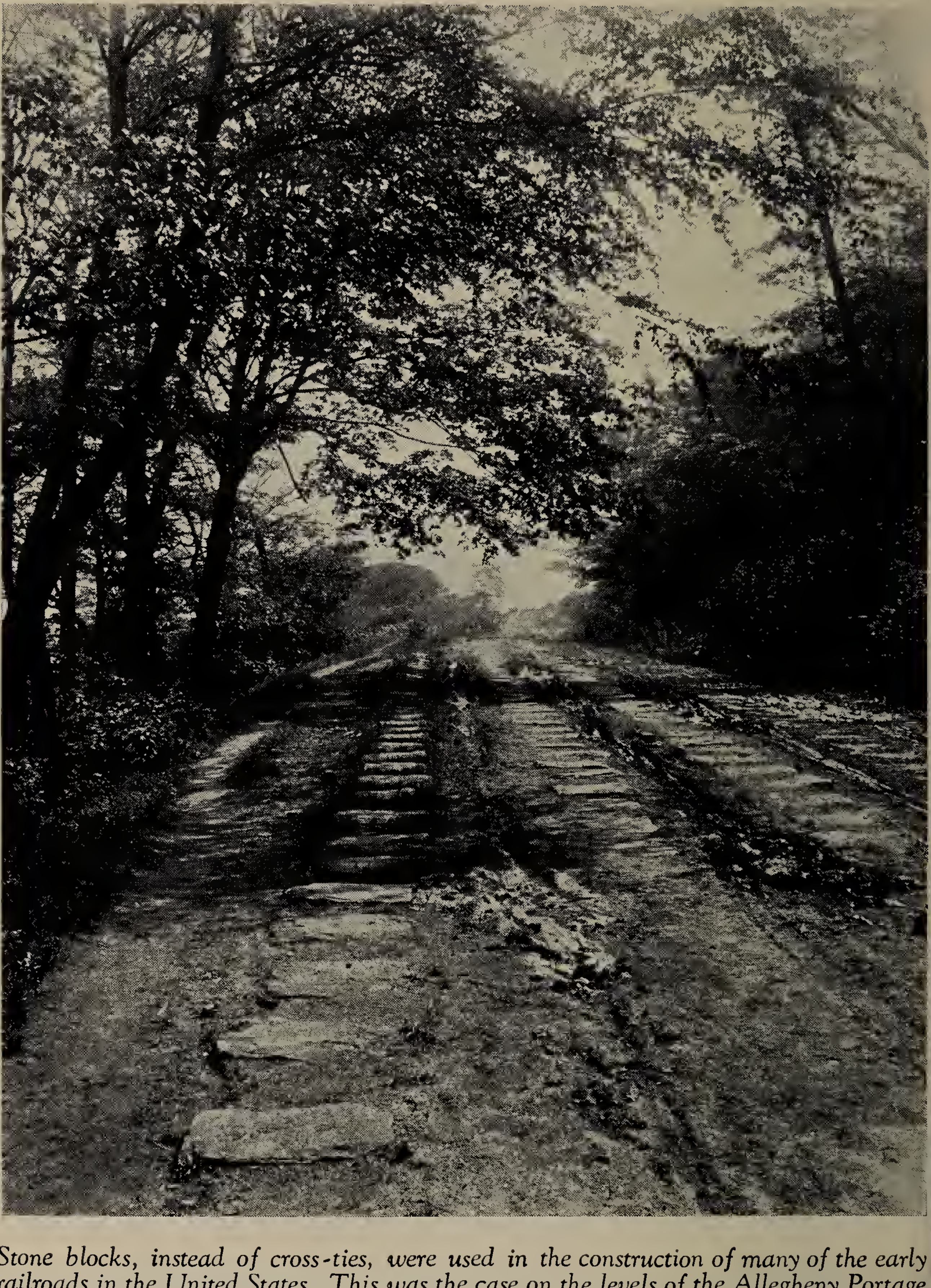
Scene on the old Pennsylvania Canal

overcome which with a similar weight, three years ago, would have required the space of three days. As soon as we arrived at the foot of plane number one, the horses were unhitched and the cars were fastened to a rope, which passes up the middle of one track and down the middle of the other. The stationary steam engine at the head of the plane was started and the cars moved majestically up the steep and long acclivity in four minutes; the length of the plane being 1,608 feet, perpendicular height 150 feet.

Magnificent Tunnel

"The cars were now attached to horses and drawn through a magnificent tunnel 900 feet long, having two tracks through and being cut through solid rock nearly the whole distance. Now the train of cars were attached to a steam tug to pass a level of 14 miles in length. This lengthy level is one of the most interesting portions of the Portage Railroad from the beauty of its location and the ingenuity of its construction. It ascends almost imperceptibly through its whole course, overcoming a perpendicular height of 190 feet. The Valley of the Little Conemaugh is passed on a viaduct of the most beautiful construction. It is of one arch, a perfect semi-circle with a diameter of 80 feet built of cut stone and its entire height from the foundation is 78½ feet. When viewed from the bottom of the valley it seems to span the heavens and you might suppose a rainbow had been turned to stone.

"The 14 miles of this second level are passed in one hour and the train arrives at the foot of the second plane, which has 1,760 feet of length and 132 feet of perpendicular height. The third level has a length of 1⅝ miles, a rise of 14½ feet and is passed by means of horses. The third plane has a length of 1,480 feet and a perpendicular height of 130 feet. The fourth level is two miles long, rises 19 feet, and is passed by means of horses. The fourth plane has a length of 2,196 feet and a perpendicular height of 188 feet. The fifth level is three miles long, rises 26 feet and is passed by means of horses. The fifth plane has a length of 2,629 feet and a perpendicular height of 202 feet and brings you to the top of the mountain, 2,397 feet above the level of the ocean, 1,172 feet above Johnstown and 1,399 feet above Hollidaysburg. . . . . . . Three short hours have brought you from the torrid plain to a refreshing and invigorating climate. The ascending apprehension has left you, but it is succeeded by the fear of the steep descent which lies before you and as the car rolls along on



Stone blocks, instead of cross-ties, were used in the construction of many of the early railroads in the United States. This was the case on the levels of the Allegheny Portage Railroad. This picture was taken near Hollidaysburg, Pa., and shows the ruins of the Old Portage roadbed this giddy height, the thought trembles in your mind that it may slip over the head of the first descending plane, rush down the frightful steep and be dashed into a thousand pieces at its foot.

"The length of the road on the summit of the mountain is 1⅝ miles and about the middle of it stands a spacious and handsome stone tavern. The eastern quarter of a mile, which is the highest part, is a dead level; in the other part there is an ascent of 19 feet. The descent on the eastern side of the mountain is much more fearful than the ascent on the western, for the planes are much longer and steeper, of which you are made aware by the increased thickness of the ropes and you look down instead of up.

"There are also five planes on the eastern side of the mountain and five slightly descending levels, the last of which is nearly four miles long and leads to the basin at Hollidaysburg; this is traveled by cars without steam or horse, merely by the force of gravity.

"In descending the mountain you meet several fine prospects and arrive at Hollidaysburg between 12 and 1 o'clock."

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FROM PHILADELPHIA TO HOLLIDAYSBURG

EXTRACTS from other letters in this volume give the writer's impressions of his journey from Philadelphia to Hollidaysburg, on the westward trip, over the Philadelphia and Columbia Railroad and the Pennsylvania canal. The narrative begins at a hotel in Philadelphia:

"We sat down to breakfast at 7.30 a. m. The omnibus drove to the door a bad half hour earlier than the agent had promised, causing us to swallow our coffee furious hot with haste. . . . We first drove to the corner of Eleventh and George streets to pick up a man, then to Arch and Ninth to take in a boy . . . Then up Ninth . . . and took in a man and woman at Wood street and then took a turn into Eleventh street where we got . . . two women and two children. . . . Being now full we proceeded to the depot in Broad street to be transferred to a railroad car. After a quarter of an hour of confusion the passengers and their trunks being at length segregated, the former were packed inside and the latter (the passengers) outside. We had chosen a unilocular car of oval shape with a seat running round the entire outside, so that the nose of each passenger inclined toward some point in a straight line drawn between the foci of the ellipse.

"There were in the car about twenty good looking people of all sexes and sizes . . . . Two cars filled with passengers and covered with baggage are drawn by four fine horses for about four miles to the foot of an inclined plane which is on the western bank of the Schuylkill and is approached by a spacious viaduct extending across the river, built of strong timber and covered with a roof. . . . The cars traveled at the rate of six miles an hour. The ride to the foot of the plane at Belmont is very interesting, first passing through a deep cut made forty years ago for a canal that was never finished . . . .

Steam 'Tug' Awaits

"At the foot of the inclined plane the horses were loosed from the cars; several of which . . . were tied to an endless rope, moved by a steam engine placed on the top of the plane, and presently began to mount the acclivity with the speed of five miles an hour. . . . When the cars had all arrived at the top of the plane, some twelve or fourteen were strung together like beads, and fastened to the latter end of a steam tug, which was ready, wheezing, puffing and smoking as if anxious to be off. All these little ceremonies consumed much time, but finally the train started.

"After many stoppings to let out passengers and to let in water, and after taking into our eyes many enchanting views, and millions of little pestilent triangular cinders, we arrived at Lancaster at 3 p. m.

Some Great Faults

"The Columbia Railroad is made of the best materials and has cost the state a great sum; but it has some great faults. The curves are too numerous and their radii generally too short, in consequence the journey to Columbia (eighty miles) consumes seven or eight hours instead of four or five. The viaducts are built of wood instead of stone, and the engineers, doubting their ability to bear the two trains at once, have brought the two tracks on them so close together as to prevent trains passing at the same time. The roofs are so low as to prevent the locomotives from having chimneys of a sufficient height to keep the cinders out of the eyes of the passengers and to prevent the sparks from setting fire to the cars and baggage. The chimneys of the steam tugs are joined, and in passing a viaduct the upper part is turned down which allows the smoke to rush out at so small a height as to envelope the whole train in a

Remains of Pennsylvania Canal Locks near Blairsville

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dense and noisesome cloud of smoke and cinders."

After passing the night at a hotel in Lancaster, the passenger continued the journey the next morning:

"We left Lancaster at 5 a. m. in a railroad car drawn by two horses, tandem; arrived at Columbia in an hour and a half and stopped at Donley's Red Lion hotel—took breakfast and dinner. Columbia is twelve miles from Lancaster on the east bank of the Susquehanna. There is an immense bridge over the Susquehanna, composed of massy timber on stone piers. It is new, built within three years. An ice packet took away the old bridge. Here is the western termination of the railroad. Goods for the great west are transhipped into canal boats. Columbia has about 2,000 souls.

"The state does not afford the public as good commodity of traveling as the public ought to have for the money paid.

"At 4 p. m. we went on board the canal boat of the Pioneer line, to ascend the canal which follows the eastern bank of the Susquehanna.

Sleeping Facilities

"A canal packet boat is a microcosm that contains almost as many specimens of natural history as the ark of Noah. It is nearly eighty feet long and eleven feet wide and has a house built in it that extends to within six or seven feet of stem and stern. Thirty-six feet in length of said house are used as a cabin by day, and a dormitory by night; the forward twelve feet being nocturnally partitioned off by an opaque curtain, when there are more than four ladies on board, for their accommodation. In front of said twelve feet, there is an apartment of six feet containing four permanent berths and separated from the cabin by a wooden partition in it; this is called the ladies' dressing room and is sacred to their uses.

"At 9 p. m. the steward and his satellites begin the work of arranging the sleeping apparatus. This consists of a wooden frame six feet long and twenty inches wide, with canvas nailed over it and a thin mattress and sheets, etc., to match. The frame has two metallic points on one side which are inserted into corresponding holes in the side of the cabin and its horizontality is preserved by little ropes descending from the ceiling fastened to its other side.

"There are three tiers of these conveniences on each side, making twenty-four for gentlemen and twelve for ladies, beside the four permanent berths in the ladies' dressing room. The number of berths however does not limit the number of passengers; for a packet is like Milton's Pandemonium and when it is brim full of imps the inhabitants seem to grow smaller so as to afford room for more poor devils to come in and be stewed; and tables and settees are put into a sleeping fix in the twinkling of a bed post.

"Abaft the cabin is a small apartment four feet square in which the steward keeps for sale all sorts of potables and some sorts of eatables. Abaft that is the kitchen. . . . The breakfasts, dinners and suppers are good of which the extremes cost 25 cents each and the mean 37½ cents.

"Bridge, Low Bridge"

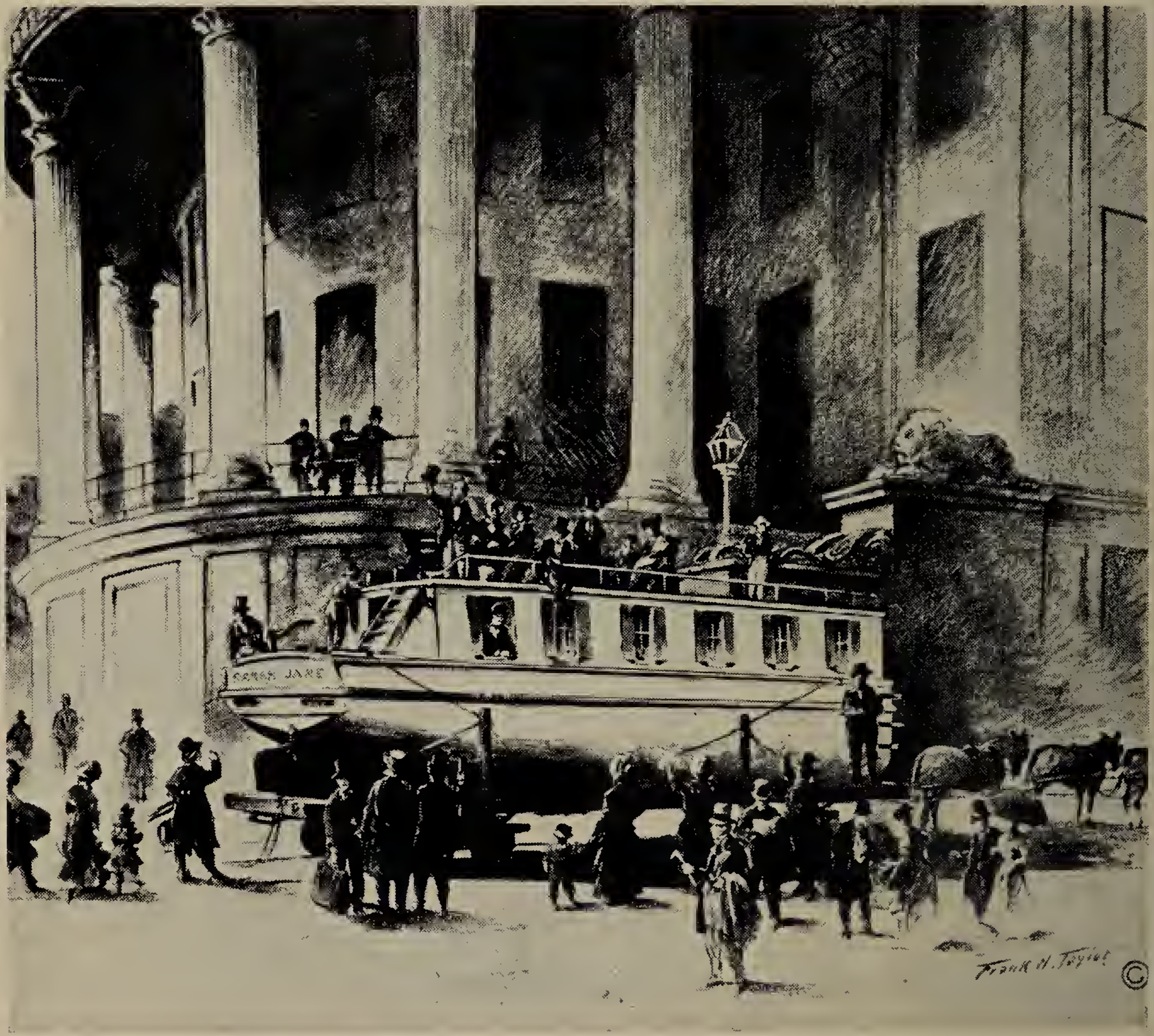
"The passengers can recreate by walking about on the roof of the cabin, at the risque of being decapitated by the bridges which are passed under at short intervals of time. But this accident does not often happen for the man at the helm is constantly on the watch to prevent such and gives notice of the approaching danger by crying out 'bridge, low bridge.' This machine with all it inherits is dragged through the water at the rate of three and one-half miles per hour by three horses, driven tandem by a dipody with a long whip who rides the hindmost horse. The rope (tow line) which is about 100 yards in length, is fastened to the side of the roof at a distance of twenty-five feet from the bow; it can be loosed from the boat in a moment by touching a spring. The horses are changed once in about three hours, and seem very much jaded by their work. . . . At an hour past midnight, 1 a. m., we arrived at Harrisburg where the boat stopped one-half hour to let out and take in passengers. . . . Harrisburg contains over 4,500 inhabitants. Tired of the night we retired and tried to sleep it into morning. At 4 a. m. we rose and finding ourselves unrefreshed and weary with unrest and heat determined to land on Duncan's island, which we were now approaching. The canal runs along the southwestern side of a mountain, in whose basement of rock it is partly cut and separated from the Susquehanna by an enormous wall of stone and earth. It debouches through a wide opening of solid masonry into the mighty river here converted into a lake by an immense dam. As the boat entered the river, the horses ascended to a gallery high in the air, attached to the side of a great bridge of timber (Clarks Ferry Bridge) . . . and thus drew us across the wide expanse of water.

Duncan's Island

. . . The boat entered the canal on the southwestern side of Duncan's island through a superb lock of solid masonry; the romantic river Juniata discharging its limpid waters into the Susquehanna close to the left. The meeting of the waters is an interesting locality and should be seen to be appreciated. After proceeding a furlong the boat stopped. We landed and took up our quarters at Mrs. Duncan's, whose spacious mansion stands on the island about 100 yards from the northern bank of the canal.

"At Duncan's island we had a comfortable and refreshing night's rest and at 6 a. m. embarked in the Canal packet, Delaware, Captain Williams, to continue our voyage to Hollidaysburg. The canal pursues the bank of the island for about a mile and then crosses the Juniata over a substantial aqueduct built of timber and roped in. . . . In the course of the day we passed Millerstown, Mexico and Mifflin and arrived at Lewistown before sunset, a distance of about forty miles. . . .

"The discipline and arrangements on board of Captain Williams' packet are excellent and his cook, a Maryland black, is a master of arts in culinary matters. . . . We passed a tolerable night though there were twenty-eight in the men's cabin. . . . Arrived at Huntingdon at 7 this morning. In the course of the day we passed Petersburg, Alexandria and Williamsburg. At one-half past 6 p. m. the packet glided into the basin at Hollidaysburg. In this artificial basin, which is large and commodious, terminates that part of the Pennsylvania canal which lies east of the Allegheny mountains. The goods destined to the west are taken from the boats and placed in burthen cars which are to carry them over the mountains by means of the Allegheny Portage Railroad."



All aboard for Pittsburgh! Section of Canal Boat leaving Third and Walnut Streets, Philadelphia, in 1843

DICKENS'S IMPRESSIONS OF PORTAGE RAILROAD IN 1842

CHARLES DICKENS, while touring the United States in 1842, made a trip from Harrisburg to Pittsburgh over the Main Line of Public Works. He later set forth his impressions in a volume entitled "American Notes," but only his comments on the Allegheny Portage Railroad are quoted here:

"On Sunday morning we arrived at the foot of the mountain, which is crossed by railroad. There are ten inclined planes; five ascending, and five descending; the carriages are dragged up the former, and let slowly down the latter, by means of stationary engines; the comparatively level spaces between being traversed, sometimes by horse, and sometimes by engine power, as the case demands. Occasionally, the rails are laid upon the extreme verge of a giddy precipice; and looking from the carriage window, the traveler gazes sheer down, without a stone or scrap of fence between, into the mountain depths below. The journey is very carefully made, however; only two carriages traveling together; and, while proper precautions are taken, is not to be dreaded for its dangers.

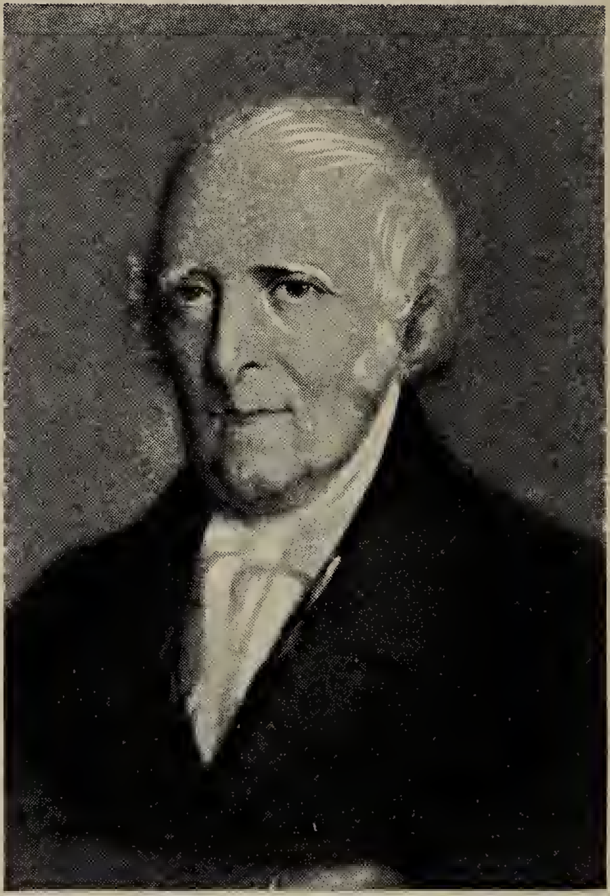
"It was very pretty traveling thus at a rapid pace along the heights of the mountains in a keen wind, to look down into a valley full of light and softness; catching glimpses, through the tree-tops, of scattered cabins; children running to the door; dogs bursting out to bark, whom we could see without hearing; terrified pigs scampering homeward; families sitting out in their rude gardens; cows gazing upward with a stupid indifference; men in their shirt sleeves, looking on at their unfinished houses, planning out tomorrow's work; and we riding onward, high above them, like a whirlwind. It was amusing, too, when we had dined, and rattled down a steep pass, having no other moving power than the weight of the carriages themselves, to see the engine, released long after us, come buzzing down alone, like a great insect, its back of green and gold so shining in the sun that if it had spread a pair of wings and soared away, no one would have had occasion, as I fancied, for the least surprise. But it stopped short of us in a very business-like manner when we reached the canal; and, before we left the wharf, went panting up this hill again, with the passengers who had waited our arrival for the means of traversing the road by which we had come."

JOHN STEVENS, FATHER OF THE PENNSYLVANIA RAILROAD

COLONEL John Stevens may properly be regarded as the father of the Pennsylvania Railroad, because he not only conceived the idea of a railroad from Philadelphia to Pittsburgh, but he obtained, as already pointed out, a charter for the original Pennsylvania Railroad Company from the state Legislature in 1823.

Stevens's vision, as recorded in the following extract from a letter he wrote in 1823, actually contemplated, however, the expansion of the Pennsylvania Railroad into much the position it occupies today.

"*And when this great improvement* (*the Pennsylvania Railroad*) *in transportation shall have been extended to Pittsburgh and thence into the heart of the extensive and fertile state of Ohio, and also to the great western lakes, Philadelphia may then become the grand emporium of the western country. The improvement, when once introduced, will unquestionably be extended from Philadelphia across New Jersey to the City of New York.*"


Colonel John Stevens

Among his other claims to fame are the facts that he was the first practical advocate of steam railroads in this country and that he built the first locomotive in America to be driven by steam on a track.

Stevens, who enjoyed a wide reputation as a patriot and inventor, was an enthusiastic advocate of railroads instead of canals, and he wrote, in 1812, the first document on steam railroads published in the United States. The pamphlet was entitled, "Documents Tending to Prove the Superior Advantages of Railways and Steam Carriages over Canal Navigation." Stevens asserted *that speeds of 30, 50 and 100 miles an hour* *would some day be readily practicable*, and he urged that America be first to adopt railroads. This pamphlet has been described as "The birth certificate of all railroads in the United States."

Stevens's advocacy of railroads finally led, in 1823, to the chartering by the Pennsylvania Legislature of "The President and Board of Directors of the Pennsylvania Railroad Company."

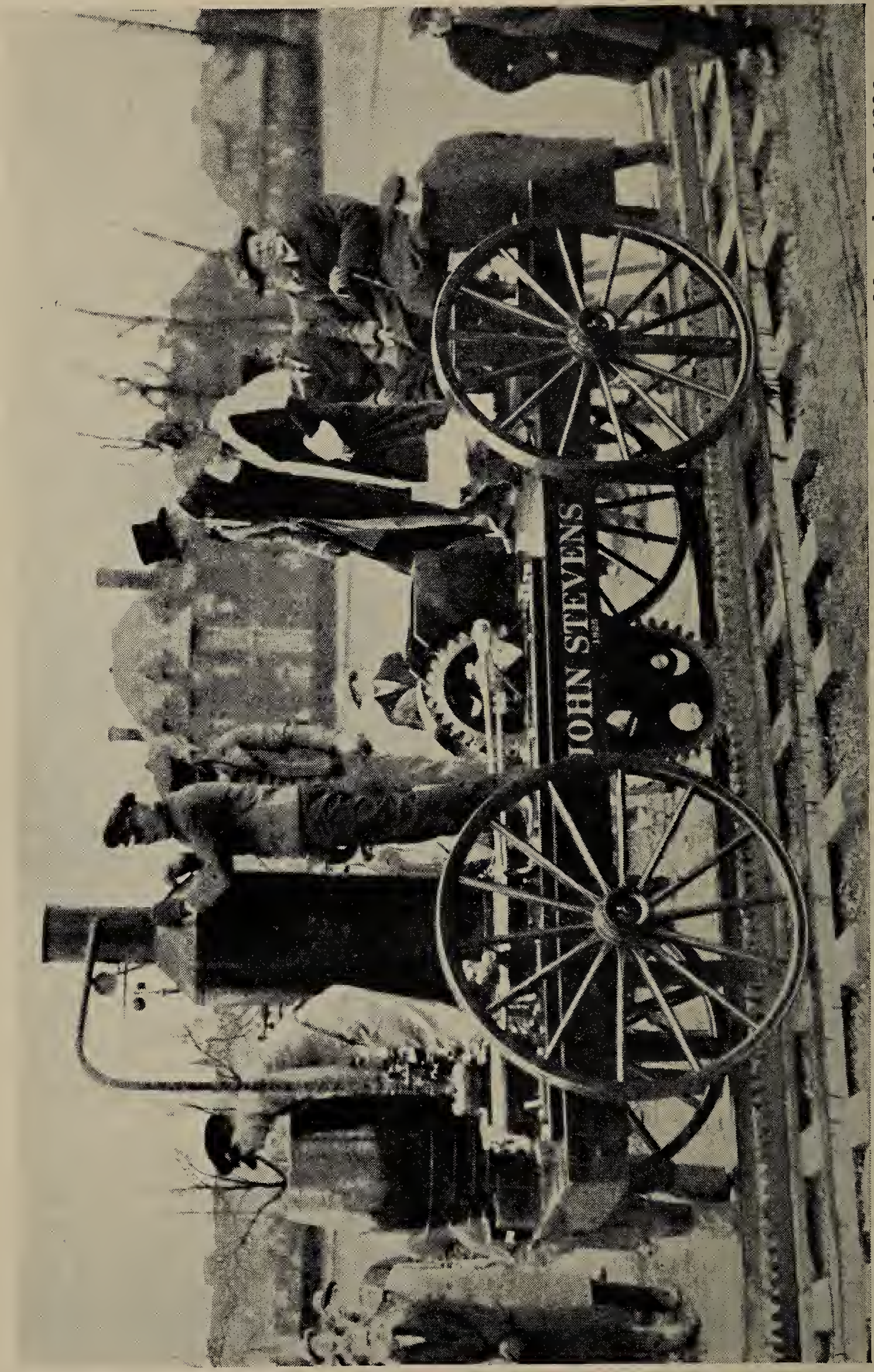
Locomotive Exhibited

Owing to the scarcity of capital and to general skepticism concerning the utility of the steam locomotive, Stevens and the officers of the newly organized company found themselves unable to finance the proposed railroad. Following this disappointment, Stevens returned to his estate at Hoboken and produced, in 1825, America's first steam locomotive. His purpose in designing and building this locomotive was to convince doubters that steam operation of railroads was practical and, further, he expected it to be used on the Pennsylvania Railroad, in view of the fact that the Society for Internal Improvement, organized by his friends in Philadelphia in 1824, had continued to support his campaign for the construction of the line.

Although Stevens's locomotive was a crude affair, it was important from an historical viewpoint because it proved conclusively that the steam locomotive was a practical machine. This pioneer American locomotive was demonstrated successfully by Stevens in 1825, before members of the Pennsylvania Society for Internal Improvement on his estate at Hoboken, where the Stevens Institute of Technology is now situated. At that time, the locomotive carried six persons around a circular track and attained a speed of more than twelve miles an hour. A small model of this locomotive and its original boiler and safety valve have been on exhibition for many years in the Smithsonian Institution at Washington, D. C.

The frame of the Stevens locomotive was 16 feet long and 4 feet, 2 inches wide, and it was carried by ordinary wagon wheels which, of course, had no flanges. In order to guide the wheels on the track, vertical posts were placed at each corner of the frame, and each post was equipped with a caster which bore horizontally against the inside of the rails.

The multi-tubular boiler consisted of top and bottom headers, each header being made in halves and provided with bolts that held them together securely. These headers were connected by twenty tubes, the outside diameter of each being



Close-up view of the working model of the John Stevens locomotive at the Stevens Institute, November 23, 1928. Those in costume are John Stevens 7th, and a cousin, Emily Lewis Stevens

$1\frac{3}{16}$ inches. The boiler, which was 45½ inches high, was enclosed in a casing, the upper end being conical in shape and terminating in a smoke-stack. A door in the conical part of the casing permitted pieces of wood to be dropped into the firebox, which was surrounded by the tubes. The similarity of this general scheme of a central combustion space completely surrounded by vertical water tubes, to some of the latest types of steam generators, introduced within the last few years, is striking. Evidently John Stevens, in constructing this boiler, had the germ of an idea that lay dormant for nearly 100 years before reaching its present dominant position in American boiler practice.

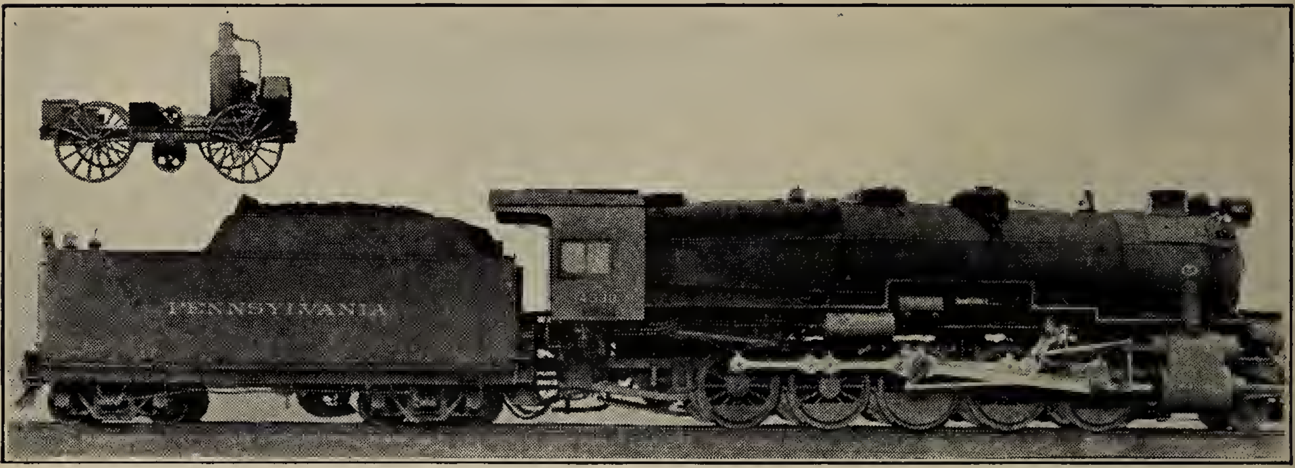
A pipe conducted steam from the boiler to the one cylinder, which was fastened to the frame nearby. The cylinder was 5 inches in diameter and had a 12-inch stroke. The engine's power was exerted on the rack-rail by means of two gears attached to the frame, and thus was locomotion obtained.

The circular track on which this locomotive was operated was approximately 200 feet in diameter. On one side the track was thirty inches higher than the track surface at a point diametrically opposite. The track was built in this manner to show that the locomotive could be operated on a grade, in as much as the general opinion at that time was that a steam locomotive could be operated only on a level track. Cross-ties carried the rails, which were made of 3 inch x 4 inch planks, covered on top with iron plates, ¼ inch thick. The cast iron rack-rail, also anchored to planks, was placed midway between the two running rails.

Tribute to Stevens

As a tribute to the memory of Stevens, the Pennsylvania Railroad Company participated in the ceremonies held at Stevens Institute on November 23, 1928, to mark the inauguration of Dr. Harvey N. Davis as president of the school. The Company's part in the celebration was the construction at Altoona Works and the operation on the campus at the Institute of a full-sized working model of the Stevens locomotive. The Pennsylvania Railroad obtained the necessary data for the construction of its replica from the model and original parts in the Smithsonian Institution and from Stevens's own manuscripts and drawings now in the possession of his descendants. The Railroad also reproduced the track and rack-rail in their original form on the campus of the School.

FIRST LOCOMOTIVE IN AMERICA COMPARED WITH MODERN ENGINE



More than a century's progress in the development of the steam locomotive is the story told by the accompanying picture. It gives an accurate comparison of the size of the John Stevens locomotive with that of the Pennsylvania Railroad's Class I-ls engine, which is of the decapod type, has ten driving wheels and is today the Company's standard locomotive for the heaviest freight service. A comparative table of principal facts follows:

	John Stevens Locomotive	*Pennsylvania Railroad I-ls Locomotive*
Wheel diameter (drivers).....	57 inches	62 inches
Wheel base (locomotive and tender)..................	9 feet, 3 inches	73 feet, 4½ inches
Length overall (locomotive and tender)..............	16 feet, 1½ inches	81 feet, 10¼ inches
Cylinder dimensions........	5 inches x 12 inches	30½ inches x 32 inches
Weight in working order (locomotive and tender)......	5125 lbs.	590,800 lbs.
Weight, empty (locomotive and tender).............	4575 lbs.	435,700 lbs.

The picture shows that the Stevens locomotive is not quite half as long as the tender of the I-ls.

TRANSPORTATION PROGRESS IN PORTAGE RAILROAD TERRITORY

The Pittsburgh Division of the Pennsylvania Railroad today performs much the same transportation functions—though on a far larger scale—as did the Portage Railroad and the Western Division of the Pennsylvania Canal during the period 1834 to 1853. That is, the Pittsburgh Division carries passengers and freight up the eastern slope of the Allegheny Mountains and down the western slope to the Pittsburgh gateway, and vice versa.

The Pittsburgh Division, with certain branch and alternate routes, gives the Pennsylvania Railroad a six-track line, with the exception of one comparatively short stretch, all the way from the foot of the eastern slope to Pittsburgh. Nowhere are fewer than four tracks available.

The Portage Railroad provided a double-track line over the mountains to Johnstown and a canal from the latter point to Pittsburgh.

Statistical records of the Portage Railroad which have been preserved show that in 1836 the freight handled amounted to 52,700 tons. Ten years later it had increased to nearly 146,000 tons and, in 1852, reached a total of about a quarter of a million tons. The number of passengers carried was 25,000 in 1836, but this decreased to an average of 11,300 annually by the middle of the next decade.

The Pennsylvania Railroad at present handles more traffic over the Allegheny mountains in one day than the Portage Railroad, at the height of its usefulness, carried in a year.

PRR